SCIENCE
GOSSIP.

HARDWICKE'S

SCIENCE-GOSSIP

FOR 1871.

HARDWICKE'S

Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY M. C. COOKE, M.A.

AUTHOR OF "HANDBOOK OF BRITISH FUNGI," "A PLAIN AND EASY ACCOUNT OF THE BRITISH FUNGI," "MICROSCOPIC FUNGI," "A MANUAL OF BOTANICAL TERMS," AND OF "STRUCTURAL BOTANY," THE "BRITISH REPTILES," ETC. ETC.



LONDON:

ROBERT HARDWICKE, 192, PICCADILLY.

1872.

WYMAN AND SONS,
ORIENTAL, CLASSICAL, AND GENERAL PRINTERS,
GREAT QUEEN STREET, LONDON, W.C.

10587

1871.

ONCE again, "inexorable Time" brings us towards the close of another year, and another annual volume. It is well that we should sometimes be reminded of the rapidity with which the chariot wheels of this august personage traverse the empyrean. Somehow, every year seems to slip by us more rapidly than its predecessor. Can it be true that more than a few weeks have passed since we congratulated ourselves, and our readers, on the completion of our Sixth Volume? and now we are called upon to perform the same duty for the Seventh.

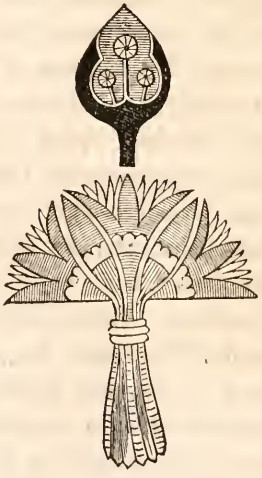
Seven years, and with them seven volumes of SCIENCE-GOSSIP, record our intercourse with some thousands of "Students and lovers of Nature." If we sit down to "take stock" of any one year, we shall, perhaps, feel disappointment that so little has been done by any of us, or that so little advance has been made in our own special subject; but if we extend our inquiry over such a period as seven years, we are compelled to confess that "the world moves still." If we take as an example the seven years just passing away, we shall realize this truth. How many Associations of Naturalists for field work date their commencement within the past seven years? What has been the influence of spirit upon kindred spirit in such large metropolitan associations as the Quekett Microscopical Club? Indeed, if we only inquire what has been done in microscopic work during seven years we shall, perhaps, end in astonishment. In special subjects of Natural History how many useful volumes have appeared to meet the wants of an increased number of students. Let us instance local floras, such as those of Middlesex, Norfolk, Worcester, &c., local avi-faunas, such as those of Norfolk, Middlesex, Berks, and Bucks; or special floras, such as lichens, fungi, and the diatoms (in progress). The title-pages of very many books will prove that something has been done since 1865,

and that the student of to-day has many advantages over the student of seven years ago, not forgetting the storehouse of facts which is contained in our own seven volumes.

In philosophical Natural History, it is only necessary to allude to the two latest of Darwin's works, whether we accept their conclusions or not, and to the controversy stirred up by them, and by the advocates of "spontaneous generation," to convince the most sceptical that the past seven years have not been barren, but rather have been fruitful in results. No two theories have ever compelled men to observe, and read, and think so much of the "mystery of life" before. And the bulk of controversy is included between the commencement of 1865 and the close of 1871.

It behoveth us to return to our text. Once again we acknowledge the good offices of all our friends, collaborateurs, subscribers, and contributors, during the past, whilst soliciting the same good offices for the future. Our communion during seven years has been agreeable, and mutually instructive, and now the time has arrived for us to separate, and bid each other "God speed." With the close of the present volume its Editor retires, and having accomplished his seven years of service, resigns his chair to his successor. No material change in the character of the journal is contemplated. If any effort is made, it will be inspired by the hope that improvement and increased usefulness will supervene. For the past we entertain respect, for the future hope. Extending to all the hands that are held out to us for a parting grasp, our own right hand of fellowship, not without some regrets do we perform this last act of our Editorial reign, in wishing to each and all—

"A Happy New Year!"



LIST OF ILLUSTRATIONS.

Acanthogorgia Jonsoni, 60.
Air in Plant-tissues, 91.
Aithurus polytmus, 228.
Alyssum, Stellate Hairs of, 83.
Ammonite, 85.
Ants, Antennæ and Spines of, 246.
Ants, White, and their Nests, 2, 3, 4.
Apparatus for Sounding, 138.
Argonauta papyracea, Shell of, 84.
Armed Bull-head, 173.
Ascidia mentula, 181.
Aspidophorus Europæus, 173.
Avocettula recurvirostris, 228.

Banded Shrimp, the, 180.
Barbel, Scale of, 188.
Bat Flea, 99.
Bath, Insects at, 229.
Beehive, Cover for, 16.
Bird Flea, 100.
Blenny, the, 174.
Bopyrus crangorum, 181.
Bream, the Black Sea, 175.

Calamite, 202, 203, 204.
Calosoma sycophanta, 108.
Campanularia dichotoma, 56.
Campephilus principalis, 227.
Candle-snuff Fungus, 77, 78.
Cantharus griseus, 175.
Carp, Scale of common, 140.
—— Scale of Golden, 20.
Chigoe, 100.
Ciniflo similis, Palpi of, 37.
Clione celata, and Spicules of do. 253.
Cnethocampa processionea, 106.
Cœnonympha Davus, 133.
Coral Polypes, 61.
Corystes Cassivelaunus, 179.
Crabs, 178, 179.
Cuphæa platycentra, 81.

Dab, the, 177.
Diamond, "Star of South Africa," 12.
Docimastes ensifer, 227.
Dog Flea, 99.

Eel-pout, Scale of, 20.
Elecampane, 129.
Elephant Parasite, 132.
Eunicea, Spicules of, 60.
Eutoxeres aquila, 228.

Fasciation in Œnotheba, 186.
Fifteen-spined Stickleback, 175.
Fish Scales, 20, 44, 140, 164, 188, 236, 260, 280.
Flea, Tongue and Lancets of, 156.
Fleas, 99, 100.
Flustra chartacea, 254.
—— *truncata*, 254.
Fossil Oolitic Plants, 157.

Galathea squamifera, 178.
Gasterosteus spinuchia, 175.
Gill of Swordfish, 136.
Gnat, Proboscis of, 109.
Goatsucker, 227.
Gobius niger, 173.
Gorgonia flabellum, 54, 58, 60.
—— *petechialis*, 59.
—— *pinnata*, 53.
—— *spiralis*, 59.
—— *verrucosa*, 58, 60.
—— *verticilliare*, 54.
Grantia compressa, Spicules of, 280.
Grayling, Scale of, 164.

Hair of Humble-bee, 140.
Helianthea Eos, 227.
Heliothrix auriculata, 228.
Helix ovata, Shell of, 84.
Hippolyte varians, 180.
Hive-cover for Bees, 16.
Homophyton Githago, 60.
Humble-bee, Fish-tail Hair of, 140.
Hydra viridis, 56.

Ice-box, Section of, 29.
Idolocoris elephantis, 132,
Insectaria, Public, 231.
Insects at Bath, 229.
Inula Helenium, 129.
Isis hippuris, 59.
Ialus terrestris, 38.
Ivory Bill, 227.

Leptogorgi, Spicules of, 60.
Lesbia Gouldii, 227.
Lesser Weever, the, 171.
Linyphia confusa, Palpi of, 37.
Loach, Scales of, 275.

Markings of Podura Scale, 205.
Marsh Ringlet Butterfly, 133.
Martins, Sand, 135.
Masked Crab, the, 179.
Matthews' Turntable, 68.
Melithœa coccinea, 60.
Membranipora pilosa, 254, 255.
Minnow, Scales of, 44.
Mole Flea, 99.
Myrmica ruginodis, Antenna and Spines of, 246.

Nautilus pompilius, Shell of, 84.
Nika edulis, 180.
Nostoc commune, 260.

Onosma tauricum, Hairs of, 83.
Oolitic Plants, Fossil, 157.
Orange Peziza, 275.

Palpi of Spiders, 36, 37.
Parasite of Elephant, 132.
Perch, Scale of, 260.
Perch, Skeleton of the, 170.
Peziza aurantia, 275.
Phæthornis anthophilus, 228.
Pike, Scale of, 236.
Plants, Fossil, Oolitic, 157.
Plant-tissue containing Air, 91.
Platessa limanda, 177.
Podura Scale, Markings of, 205.
Polypes, Coral, 61.
Primnoa verticalosa, 61.
Proboscis of Gnat, 109.
Processionary Moth, 106.
——, Hairs of, 107.
Public Insectarium, 231.
Pulex canis, &c., 99, 100.

Riphidogorgia flabellum, 60.
Rock Goby, the, 173.

Sand Martins, 135.
Scales of Barbel, 188.
—— Common Carp, 140.
—— Eel-pout, 20.
—— Golden Carp, 20.
—— Grayling, 164.
—— Loach, 280.
—— Minnow, 44.
—— Perch, 260.
—— Pike, 236.
Shoveller, Bill of, 229.
Skeleton of the Perch, 170.
Snipe, Bill of, 229.
Sounding Apparatus, 138.
Spicules of *Clione celata*, 253.
—— *Grantia compressa*, 280.
—— Sea Fans, &c., 60, 61.
—— *Spongilla fluviatilis*, 280.
Spiders, Palpi of, 36, 37.
Spongilla fluviatilis, Spicules of, 280.
Squirrel Flea, 100.
"Star of South Africa" Diamond, 12.
Stellate Hairs, 83.
Stickleback, the Fifteen-spined, 175.
Stonechat, 136.
Strepsodus, Tooth of, 45.
Swan, Bill of, 229.
Swordfish, Gill of, 136.

Tongue and Lancets of Flea, 156.
Tooth of *Strepsodus*, 45.
Trachinus viperu, 171.
Trawl, the, 170.
Triton imbricata, Shell of, 84.
Turntable, Dr. J. Matthews', 68.

Walckeneara cristata, 36.
—— Palpi of, 36.
Whinchat, 136.
White Ants and their Nests, 2, 3, 4.
Woodcock, Bill of the, 228.
Wrasse, the Corkwing, 176.

Xylaria hypoxylon, and *Conidia*, &c., of same, 77, 78.

WHITE ANTS.

By CHARLES HORNE, F.R.Z.S., late B.C.S.

THE nests of the Termites, or White Ants, are very common in India; but although so common, there is not one person in a thousand who has seen the internal economy of one of these wonderful abodes. I had often wished to do so, and although I had resided very many years in the country, during most of which I had studied natural history and collected specimens, it was not until twenty years or more had passed that I had an opportunity.

This was at Etawah, N.-W. Provinces, in 1867, and the result was so curious and interesting that I think it worth recording in Science-Gossip, whose pages are devoted to such topics.

I had offered a reward for a queen white ant, and at the same time I determined to dig for one myself; not that the natives were not well aware of the locality of her abode, but that they would not take the trouble to dig her out. I had observed several mounds formed by these insects near the gate of the court-house, and one morning, taking with me three men, I dug up the hard-baked soil in their midst. There were five of these conical elevations, the highest being the central. This was about a foot and a half above the level of the plain, whilst the four smaller ones, which were placed at the corners of a square of perhaps five feet, in the midst of which stood the chief one, or citadel, were each perhaps eight inches in height.

It was on the 22nd of November, so that there had not been any rain for some months, and the grass was all dried up, and the earth extremely hard. I first cut off the heads of each of the mounds to ascertain the direction of the chief galleries, as well as to see which was the residence of royalty, and where the nurseries might be placed.

Within each eminence were large domed chambers supported on massive pillars composed of the finest sand, all of which had passed through the bodies of the workers ere it had been incorporated into the compact substance of which the sand pillar was constructed. There were also flying bridges, with footpaths on them trodden smooth and polished by the passage of the millions of feet of these blind insects, into whose habitations light never enters. All paths tended towards the centre, although by digging I came on several granaries and sets of nursery-cells. These granaries are very curious structures, being as slightly constructed and friable as the general structure is solid, story upon story of cells supported by frequent walls and pillars, all of which would crumble in the hand.

The former are placed in hollow spaces excavated for the purpose, each about the size of a child's head, and contain some kind of food, supposed by many to be inspissated juices of the roots of trees, and resembling in appearance little globules of brown gum. There are perhaps three or four such granaries attached to every nest. The nurseries resemble the granaries in a great measure. In them grows a minute white fungus, much resembling a button mushroom, and about the size of a small pin's-head. This was formerly taken for food by many observers; but I do not think that it is so. It, however, abounds to such an extent that it causes the floor of the cells to assume a grey appearance, the colour of the earth being of a light brown. In these nurseries, which are in general about the same size as the granaries, may be observed the working ants and nurses carrying about and feeding from their own mouths the larvæ in various stages. These larvæ are at first very small, but they are cared for immediately they are hatched from the

egg, and the period that they remain in the egg state must be a very short one, as it is difficult to find any unhatched, while we know the rate of production to be many thousands per diem from one queen. I should state that the external three or four inches of earth above the mounds was honeycombed like a coarse sponge, although I could perceive no openings on the exterior. It is quite possible that these may have escaped my notice, as that required for a working termite to pass through is so exceedingly small; yet I think that the habits of the insects are against there having been any such, for they run a gallery underground or on the surface towards the object they wish to attack, remaining under cover all the time, and so would not need such an exit.

We dug out some three feet of earth very cleanly and carefully from under the centre mound, and although we had met with many workers and warriors, we had seen no traces of king or queen, or royal apartments; but the next stroke of the spade revealed a sight I shall not soon forget. Encased by three or four inches of solidified earth, here was the royal chamber. It was between five and six inches in length, with a low domed roof of about one inch in height and three or four inches in width. Its thick walls were pierced in every direction with the smallest holes, through which a nurse carrying one egg, or a warrior, could alone proceed. There was no gallery leading to this cell that I could observe.

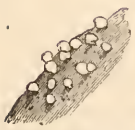


Fig. 2. Fungus in White Ants' nest.

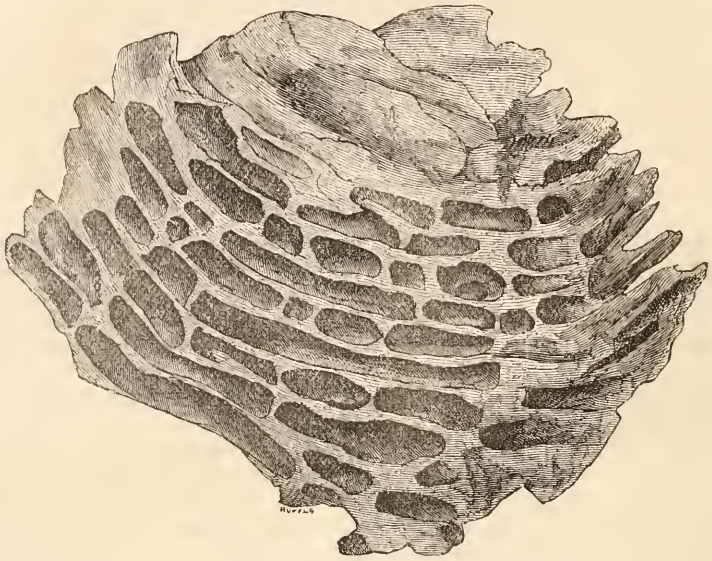


Fig. 1. Galleries in White Ants' nest.

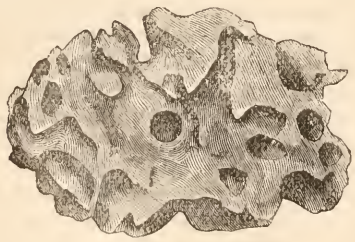


Fig. 3. Part of the living rooms.

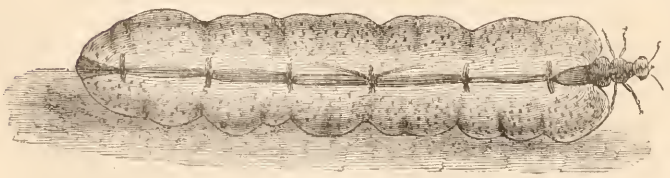


Fig. 4. Queen Ant.

The floor was trodden beautifully smooth from constant use, and in the midst rested the Queen (fig. 4). She was, as shown in the plate, about three inches in length, and presumably about three years old. Utterly unable to move in any direction, here she lived. By her side walked the King (fig. 6).

Both he and the queen have eyes, although all need for them would seem to have ceased when once they commenced their reign. His feet appeared to be all right, but the appearance of those of the queen was as if she had pawed on the ground until she had ground down her feet and claws to

their present condition. Her body is said gradually to increase in size year by year, and one writer on West-Indian Termites asserts that she lays 80,000 eggs per diem!! I, however, think that the number is overstated.

In her body nothing appears through the semi-transparent skin but the ovary, of enormous length, folded together and full of eggs, which ever move forward, impelled by a peristaltic motion, until laid.



Fig. 5. Head of Queen magnified.



Fig. 6. King.

The royal pair were surrounded by a section of a company (I counted 30) of warriors. When the royal cell was broken into, these stood up on their hind legs to attack the intruder, and fastened on my finger without any fear, allowing me to carry them away suspended in the air by their closed mandibles. Their zeal and valour are very surprising.



Fig. 7. Warrior.



Fig. 8. Eggs.

Near, however, to the tail of the mother, were thirty or forty workers or nurses, for I could detect no difference in these two classes under a strong glass, and I doubt whether there is any. These waited for each egg as laid, and trotted off with it at once to the nurseries, through one of the many galleries, which were in diameter about that of an ordinary knitting-needle, or one-sixteenth of an inch. Other loyal subjects were feeding the queen from their own mouths. Her appearance was most helpless, and the king walked listlessly up and down beside her, doubtless attending, as need be, from time to time to his own functions; although it is probable that, once impregnated, the effect, as in queen bees, lasts during life?

I obtained a second queen the same day, but I did not see the cell or the nest.

It has been often stated that if the queen be dug out, the nest will be destroyed, and never be renewed in the same place. I, however, doubt this, as I again dug up the nest above described, three months after I had refilled the hole, and found it in full working order, with new granaries and nurseries, in place of those destroyed by me, although I was not able to find a new royal cell, or king or queen.



Fig. 9. Worker, nat. size and magnified.

All are aware of the fearful ravages of this insect in many parts. It was of *Mainporì* that it was said that, at certain seasons, were a man to lie down to sleep in a blanket on the ground, he would awake in the morning to find his blanket eaten and his bones picked! This is of course an exaggeration, but it is very wonderful to see the length of covered galleries they will construct in one night, and also how they will consume the whole of the interior of a beam, leaving only a thin sheet of wood outside scarcely thicker than cartridge-paper. I have specimens of this, and as a proof that they can eat through almost anything, I remember in olden times having seen a sheet of thick lead in the museum of the East-India House at Leadenhall Street, which had been eaten through by them.

The following extract from an Indian paper, dated February 23, 1868, may be deemed of interest:—"It may be remembered by some of our readers, that in 1865 Dr. Bonavia, the Honorary Secretary of the Bengal Agri-horticultural Society at Lucknow, communicated to the Government that he had ascertained that white ants will not touch mats made from the fibre of the American aloe; and further, that the pulp separated from the fibre of the leaves of that plant may be profitably used for mixing up with the clay and cow-dung used in some buildings for plastering walls; such plaster so impregnated being apparently proof against the insects.

Since then further attention has been given to the subject in the Mauritius. The nest and exuviæ of the White Ant are there made use of as an infusion or decoction for the treatment of certain nervous affections, particularly epilepsy, and it consequently occurred to a Mr. Bick that the matters extracted from wood attacked by the insects might be found to contain some principles similar to those which exist in chloroform or other anæsthetics. A

Mr. Fleurot was accordingly solicited by the Horticultural Society to analyze the substances, and he proved the presence, in remarkable proportions, and in rather considerable quantities, of formic acid in combination with iron in the head and mandibles of the insect. He accordingly attributed the seda-



Fig. 10, Winged female.

tive effects of the nest to the combination of the iron and the formic acid in its composition, which produces a formate of iron; and as he could not trace the presence of any soluble salts or common salt in the substance under analysis, he argued that the nature of the insect must be antipathetical to salt. In proof of the correctness of this opinion, he has since ascertained that in damp cellars, where white ants once caused great destruction amongst casks of beer and wine, they were entirely driven away by strewing a layer of common salt under the barrels. He also placed some white ants in a space, and surrounded them with a circle of salt, which the insects did not dare to cross.

"These facts were originally published in a Port Louis newspaper, and are reprinted in a book by Mr. C. J. Boyle, just published. If this theory holds good in India, buildings in which *chunam* (lime) made with sea-water [this evidently applies to Bombay, where fresh water is scarce—C. H.] has been surreptitiously employed, should be tolerably free from this pest, and a ready means is afforded to planters and others to protect themselves permanently against the invasions of their uncompromising and insatiable enemy."

With reference to the above, I may remark that I have tried salt with the happiest results. Quick-lime in little tin or iron trays is, however, more commonly used, and the feet of large racks in record-rooms are often placed in these.

Before quitting the subject I will gossip a little about it.

The first heavy fall of rain (in the North-Western Provinces about the close of June) brings out the swarms of winged Termites. At dusk it often happens that they begin to emerge from some little hole in the corner of the room—on the floor—half way in the wall, or from outside. In half an hour the whole air is alive with them. If in the daytime, every bird is eating them as they fly out; the "Gekkho," or little house lizard on the wall, devours as many as he can, till at last he ceases with the tips of the wings and the legs of one sticking out of his mouth. The crows sail backwards and forwards catching hundreds; the King-crow (*Dicrurus*) dashes amongst them and eats as many as he will, and all who will—eat.

Meanwhile the numbers increase. Basins full of water, with a candle in the midst, are put down, and thousands flying to the light are thus drowned. Every device is adopted for destroying, yet some survive, bite off their own wings, and run along the ground, looking out for a place of shelter. One meets another, who, immediately holding on to his abdomen, follows him; and thus one often sees three or four in one chain holding fast and following. But what is of more importance for maintaining the race, a male meets a female, and the two go off together, and getting under a safe clod, or into some corner or hole, start a colony.

Regarding the falling off of their wings, I found it most difficult to obtain winged specimens. I offered a reward to my collectors, and I sat ready with setting-board and pins, and then with difficulty I obtained three or four. They appear to fall off directly they are dry, and if they do not speedily come off of themselves, the insects assist nature and pull them off.

It is a very strange thing to see a nice white table-cloth, in the centre of which has stood the dinner lamp, covered all over with their wings; with wingless insects taking shelter under knives, spoons, or any little bit of cover.

Once immured, they never again see the light; although how they subsist until they have faithful attendants to feed them, is one of Nature's puzzles which I am quite unable to solve. One thing strikes me as very curious, viz., the manner in which the earth used passes through the body of the worker White Ant. The insect is so transparent that it is easily to be seen.

The assimilation of their food is also extremely strange, as they derive nutriment from wood ever so dry, and from grass, and other substances, which would not appear to be capable of yielding any nourishment. Although blind, these insects evince great ingenuity in getting at their food. I have often seen them making a covered way over a thickly-painted door, and on reaching the bottom commence the projection of a circular gallery of several inches in length at an angle, until they reached some suitable food. On one such occasion, however, after all their labour, they arrived at a terraced floor in which they could make no impression. They then abandoned their gallery, and tried in another direction.

I have watched the warriors visiting the working parties, and retiring when they found that all was well. The more one observes these marvellous

colonies, the more one is at fault to find the directing guiding spirit, and one has to fall back to the instinct so wonderfully implanted in them by their Great Creator.

One reads of white-ant hills in Africa and America, upon which a bison takes his stand to look out. I have never met with such in India; although occasionally there may be three or four together, which get broken down, and new mounds rise from the top, whereby a height of four or five feet is attained, and these mounds will bear any weight without fear of being crushed.

The earth of which they are composed is prized by masons for mixing in mortar, and truly it has a wonderful tenacity and fineness of texture.

In places where these insects are at all common, one cannot place a piece of stick on the ground at night without finding it in the morning covered with a layer of earth. They are very troublesome to beds of cuttings, sometimes eating off all the roots.

I used to put a small circular piece of copper plate upon a larger piece of zinc plate, and then stand the leg of the wardrobe in the centre of the copper. I never found the insects to make a gallery across this, which I imagine acted as a kind of galvanic battery, when damped by the moisture of their earth. The rooms of many houses in India are laid with pitch, asphalte, and other preparations. This will keep them out if there be not the least crack in them through which the insect can come. They will also come over the edge, so that it is extremely difficult to exclude them.

The large hornets are very fond of them, and I have seen them catching them one by one, and making up a ball wherewith to feed their young. Other insects also eat them.

They cannot work without moisture, and although they never cease their labour day or night, they prefer darkness for their mischievous deeds. They are found in the driest desert places, and where they then obtain the necessary liquid is very strange. Their cells, being so thickly coated with earth, are comparatively cool, and the royal cell, being at a depth of at least three feet, keeps a very even temperature.

Everything they touch is stained with their acid. I once had a large box of miscellaneous goods left in Calcutta for two years in a warehouse. On my return to Calcutta, I found the contents to be a mass of white-ant earth, in which were firmly imbedded and well stained, six bronze wall bracket-shades. These alone they could not eat. I sent them to be rebronzed, and the native returned them painted black! In their case, however, the instinct is truly blind, and the insect cannot see its numerous foes, and will rebuild a gallery ten or twelve times, or as often as it is destroyed.

When lying ill, I have watched the gallery getting longer and longer with the tiny secretion of each ant, and when I have had to sweep it all away, I have next day seen the same task repeated, till at last the death perhaps of so many workers has deterred the main body from continuing the work after seven or eight calamities. The Palm or Striped Squirrel (*Sciurus palmarum*) is very fond of them, as are mice and many kinds of birds; yet their numbers steadily increase, and they were the constant plague for many years of your Indian observer.

THE STORY OF A BOULDER.

By J. E. Taylor, F.G.S., &c.

FEW of my fellow story-tellers can boast of adventures equal to mine. My life has been a restless one, and to see me quietly reposing in some bed of clay, the non-geologist would little suspect what strange romances I could tell him. I will do my best to recount them. Not many years ago this would have been totally impossible. At that time geology was chiefly made up of guesses, many of which, however, proved to be shrewdly true. The great sheets of sand, gravel, and clay which extend, more or less, over the northern, midland, and eastern counties of England—as well as over the Continent and in the United States of America, were supposed to have been the *débris* left by Noah's Flood, and were therefore called "Diluvium." But facts (stubborn things!) have accumulated in such numbers that it is now totally impossible to hold such an idea—much as many people may wish it. It is seen that the period of time when such beds were formed was as peculiar as those of other formations, and that the physical circumstances, if not the peculiar life-forms, marked it off distinctly from the rest. Hence the name now given to it of "Northern Drift," or that other of the "Glacial period," which latter I hold to be the most appropriate.

The chief interest of the "Glacial epoch" is the way with which its facts connect tertiary life-forms and geography with existing species and circumstances. The geologist is able to perceive there was no break, such as was originally supposed, but that the present epoch is intimately related to all that have gone before, and is, in fact, a continuation of many of their circumstances. It therefore links the present with the past, in a way for which knowledge-seekers cannot be too thankful. Who would imagine the scattered, disunited beds of clay, or gravel, or sand, could have been so fruitful in geological and even general interest?

Some of my companions may boast of an origin quite the opposite to my own. Theirs deals with intense heat, mine with almost as extreme cold. Of course I am speaking of my present existence as a "boulder," for before I entered that state I formed

an insignificant part of a great and continuous rocky stratum. What this rock was composed of, matters little or nothing, for we "Glacial Boulders" have no such clannish feeling as other geological story-tellers. We are composed of all kinds—and the bed of clay in which we have been deposited may be regarded as a sort of lithological Parliament, in which the representatives of every formation are assembled. But allow me, if you please, rapidly to sketch the outlines of the events which transpired before I was ruthlessly wrenched from my original rocky home, and transposed into a boulder.

As many of my hearers are aware, the earlier part of the Tertiary period was, in England and elsewhere, marked by an almost tropical climate. During the Eocene epoch, the seas of our latitude were inhabited by shells and fish of tropical types. The dry land was clothed with tree-ferns, palms, &c., and these gorgeous forests were frequented by huge serpents, strange-looking, tapir-like quadrupeds, and monkeys. The rivers, also, had their alligators and crocodiles. In short, all the types of land, fresh-water, and marine fauna and flora, which now distinguish equatorial regions, existed in England. The rocks of this period are full of proofs of the truth of what I say. Then gradually succeeded the Miocene epoch, during which the climature was less torrid. Even then, the great arctic ice-cap had not been formed at the pole, for we have abundant evidence that countries situated far north, such as Greenland and Spitzbergen, were covered with vegetable forms nearly allied to those now living in South Carolina, Japan, the Cape of Good Hope, and Australia. Then succeeded the Pliocene age, whose climate is abundantly indicated by its fine "Crags," as the beds of shells are termed. The oldest of these is called the "Coralline," and there may be found in it no fewer than twenty-seven species of shells, nearly allied to or identical with those now existing in southern latitudes. The "Red Crag" comes next in age, and this tells you by similar evidence that the climate was gradually getting colder, for the number of southern shells has dwindled to thirteen, whilst there has appeared in English latitudes species allied to those now living in northern seas. Finally, the third, or "Norwich Crag," supplements the teachings of its relatives by its total absence of southern shells, and its much greater proportion of arctic species. Another bed of Crag, situated some height above this, still further corroborates the remarkable fact I have been narrating, for its greater abundance of northern forms is as remarkable as that of the older Norwich Crag over the red. About the same age as the latter bed is a phenomenon, known as the "Forest bed," which crops out from beneath the steep cliffs along the Norfolk and Suffolk coasts. It is the site of an old forest, now paving the bottom of the German Ocean, and the imbedded stools of trees, as well as those of land and fresh-water plants, indicate a temperate mildness of climate, similar to that now marking the British islands—or, if anything, a trifle colder, as the presence of the Scotch fir and Norway spruce pine clearly shows.

My hearers cannot but be struck with the gradual refrigeration of climate, from tropical or subtropical conditions, to a temperate one. Meantime, the slow but sure change from a warmer to a colder physical circumstance clearly prophesied that the next period would probably be marked by the same law. Such proved to be the case. The change of climate indicated by the several periods I have mentioned, culminated in that "Glacial period" during which my birth as a boulder took place.

After the epoch of the "Crags," a gradual subsidence of England, as far south as what is now the Thames slowly took place. Little by little the whole country sunk beneath the sea, in which, with increasing depth, there came increased arctic cold. The greater part of Scotland—certainly the whole of the Highlands—were covered with glaciers, or sheets of accumulated snow, frozen into ice. The snow-line—which in England is now some thousands of feet above the ocean-level—then was gradually lowered by the greater cold until it was met with as low as it could possibly creep. The hills of North Wales, Cumberland, Lancashire, and other places also had their ice-cap. To what thickness this great ice-sheet accumulated, or what course, I can form no idea; but if it was anything like what now takes place in Greenland—and I have every reason for asserting that England at the time of which I am speaking, experienced Greenlandic circumstances, rather than those of any other part of the world—then this sheet of snow or ice possibly grew to be hundreds, if not thousands, of feet in thickness. Such is the case in Greenland at the present time. The fine snow accumulates on the mountain-tops, and is only got rid of by its freezing into a sheet, which is always moving down to the lowest level. In temperate and tropical climates, rivers carry off the excess of moisture—in arctic countries this can only be done by the moving ice-sheets, termed "glaciers." The Greenland glaciers debouch into the sea itself. The ice-sheet forms grand sea-cliffs, hundreds of feet high, along whose bases the angry sea eats caverns, until the toppling mass falls over, and floats away as an iceberg. Or the great ice-sheet thrusts itself right into the sea, creeping along its bottom until it comes to water deep enough to buoy up, break off, and float away the extreme end.

You will have no difficulty in perceiving that the immense mechanical force exercised by such glaciers on the solid hard rocks over which they creep must be immense. You can easily conceive how the latter must be ground down and pounded into mud; and also, how fragments would be broken

off, frozen into the great icy mass, and slowly carried away. When that portion of the glacier into which some huge fragment has thus been frozen, reaches the sea, it would be broken off, and floated away as an iceberg, carrying the enclosed fragment of rock with it. Away drifts the iceberg, carried by oceanic currents in a southerly direction, until the warmer waters gradually melt it, and then down drops the rock to the bottom of the sea, to rest perhaps thousands of miles away from its parent source.

The friction of a moving glacier elicits just enough heat to melt a portion of the ice, which flows away as water, carrying with it the finer mud or sand set free by attrition. Hence all the water flowing into the sea is turbid with mud, and this mud, as it gradually settles to the sea-bottom, is there forming what will some day be a geological deposit. In this mud arctic mollusca live and die, and will also some day be found fossilized. It was in a similar bed to this that I was dropped. Down I sank amid the oozy mud, displacing the strata, and more or less causing them to assume a contorted appearance. Well do I remember the effect produced by the largest boulders, dropped in a similar way into the same strata. They sank so deeply as to cause thin beds of shells, which had previously been horizontal, to wrap over and become almost vertical. In the Norfolk cliffs, near Cromer, where what is known as the "Coast Boulder Clay," attains a great thickness, you may see masses of chalk imbedded, which cannot be less than two hundred feet in length. The soft sand and clay beds near are so contorted that you would imagine an earthquake had produced the disturbance; but it was caused simply by the melting icebergs dropping their stony burdens. For ages this process went on—the land glaciers grinding down the solid rocks, and the sea currents strewing the *débris* over the ocean-floor. The icebergs, also, added no little to the accumulating mass.

I am told that along the North Atlantic sea-floor there is going on a similar deposit. The thousands of icebergs which set out from the north every year gradually melt as they near the more southerly latitudes. There is a great stream of warm water called the "Gulf Stream," which sets out from the Gulf of Mexico, crosses the Atlantic, and impinges on the southern and south-western coasts of Great Britain. When the northern icebergs come into contact with this, they rapidly melt, so that, of course, the sea-bottom in that place might be expected to be heaped up with the *débris* they had dropped. Actual soundings prove this to be the case; so that if the North Atlantic sea-floor could be upheaved, you would have a series of loose deposits of sand, mud, boulders, &c., not unlike those which were formed during my own lifetime.

I am not left without a natural barometer to fix the depth to which the dry land went down. In North Wales is a hill called Moel Tryfaen, and near its summit, at seventeen hundred feet above the sea-level, is an old *sea-beach*, formed when the submergence had reached its maximum. After this there came as gradual an upheaval, and this is marked in various places in Great Britain by a graduated series of raised beaches, ranging in height from that above given to those only a few feet above high-water mark. Gradually the land appeared more extensively above the water. The climate was still intensely cold and arctic. The icebergs coming from Scandinavia frequently brought with them arctic plants growing on the frozen mass of gravel or sand. Whenever these icebergs stranded on the coast, these plants were able to migrate inland, and very soon they covered the new land with an arctic and sub-arctic flora. Those soft beds of sand or mud lying along the sea-bottom which first came within the influence of the surface-currents, were very much worn away or denuded. This was especially the case with an extensive sheet known as the "Chalky Boulder Clay," from its containing so many small rounded pebbles of chalk, as well as large boulders of other rocks.

Among farmers, this goes by the name of "Heavy lands," and the bed is usually found occupying the highest grounds, having been denuded by marine currents into what are now valleys. A good deal of the material thus worn away was carried by the waves to form beds of later date, which sometimes go by the name of "Post-glacial," although they were really deposited during the Glacial epoch. Of course, we boulders had no means by which we could be transported, and so we were exposed to current-action. The waves rubbed us together, toning down our sharp angles, and very frequently obliterating the scratches and groovings which we had before borne as evidence of our ice-conveyance. In this way a huge gravel or boulder bed was formed on the highest grounds, the soft matrix having been washed away.

When England was again joined to the Continent, and before the Straits of Dover had been cut out, the European land animals migrated hither. The climate, though still rigorous, was nothing like so cold as it had been during the middle of the Glacial period. Among the animals thus roaming amid semi-arctic woods and wilds, were the "Mammoth" (*Elephas primigenius*) and the Hairy Rhinoceros. Both these animals were covered with long woolly hair to protect them from the severe cold. Ireland was then joined to England by way of the Isle of Man, and over this extensive prolongation of Europe in a westerly direction, another animal, the "Irish Elk," roamed in great numbers. The Reindeer, Glutton, Lemming, Musk-deer, and other animals affecting high latitudes, then abounded in England, their bones being fre-

quently found in the later deposits, as well as in the cave breccias. An almost arctic flora covered the plains, and crept up the hill-sides as far as the then perpetual snow-line. Glaciers still debouched through the mountain defiles into the plains, and moraines, or heaps of angular stones, thrust forward by the advancing foot of the glacier, still remain in Scotland, Cumberland, and Wales, to indicate how far these glaciers travelled. Where the ice-sheet descended from the mountains, of course there was the greatest amount of pressure. Here great hollows were scooped out of the hard, solid rocks, and these hollows are now filled with fresh water, and form the lakes of North Wales, Lancashire, and Cumberland, and, on the Continent, in Switzerland. The Swiss glaciers, by the way, were then much more extensive than they now are. At present their growth is impeded by a warm wind, which accumulates over the Desert of Sahara, in North Africa. But, at the time of which I speak, the Sahara was a sea, as is indicated by the abundance of ordinary cockles and mussels found a few feet below its terrible drifting sands. Then, no warm wind could form, and the European glaciers grew unchecked. Again, the temperate mollusca, such as oysters, cockles, mussels, &c., had migrated from our latitudes, and taken up their abodes in seas which, although farther south, represented in glacial times, as far as the temperature was concerned, the seas of Great Britain.

As the climate became warmer, the arctic plants left the lowlands, where they became extinct. Their places were taken by a more southerly flora, which had set out from Asia Minor, and covered the greater part of Europe. The arctic plants occupying the highest grounds, therefore, were the only remains of this once widely-spread arctic flora, which could find suitable and fitting circumstances amid which they could live. And here the wandering botanist now finds them—living proofs of the truth of what I have been saying respecting the long arctic winter of the northern hemisphere. Subsequently, Ireland was separated from the Continent, England having been cut off some time before. When the climate had toned down, MAN appeared on the scene. His weapons are found in the most recent of deposits, and his bones beneath the stalagmitic floor of limestone caves. The woolly-haired Elephant and Rhinoceros disappeared for ever; the Glutton, Lemming, Reindeer, &c., like the arctic plants, migrated with the decreasing cold into northern regions. Meantime, the bottom of the glacial sea had become dry land. The old, hard, and barren rocks had been thickly strewn with rich subsoils, the very elements necessary for agricultural purposes. Nature had done, by means of her glacier and other action, exactly what the scientific farmer sometimes does when he adds artificial manure to improve his soils. She had ground and pounded all the older rocks to make up a new compound that should possess all their valuable mineral ingredients. In this way only could mankind have been blessed with the necessary elements for the purposes of husbandry. Thus, in comparison with other periods, that when man was introduced was especially favoured.

URASTER RUBENS.

As marine aquaria are now so well known and so widely distributed, it seems a pity that people with such means at their disposal should not undertake the keeping and study of the more delicate animals of our seas and shores; as, by such means, many disconnected facts and observations in natural history may be linked together in a manner to be understood. The difficulty of obtaining animals inland is no doubt often a bar to their successful study, as they must be in a healthy condition when placed in the tank. My own observations have not been so numerous as I could wish, I not having been able to obtain many objects in a sufficiently healthy state to live. I refer more particularly to the Echinoderms. This great class, which is entirely marine, contains some of the most beautiful and graceful animals that are known. But I have now to describe the more common member of this class, *Uraster rubens*.

The animal of which I now speak belongs to the sub-family Urasterina, distinguished by having four rows of suckers in each of the ray-avenues. The body of this Echinoderm, which is a slightly elevated disk, is elongated into five stout arms or rays, which are rather rounded, and are really extensions of the body, of which they form part. It is enclosed in a toughish skin, in which are imbedded calcareous plates of various shapes, rather closely congregated, so as to form a strong skeleton. In certain situations all over the dorsal surface, these plates are raised into strong spines, which give the star-fish that prickly feel when handled. The arrangement of these large spines does not seem to be after any particular order: three sets of long spines bordering the avenues especially characterize the genus.

The avenues on the under side of the rays are filled with the ambulaera. These are fleshy arms furnished with suckers at their extremities, by which the animal can attach itself, and are used as organs of progression. They are very contractile, and highly sensitive, as by a slight touch, when the animal is in repose and the arms are almost motionless, we can set them all in motion.

But let us examine the animal more closely by means of the microscope, to do which we must select one that will go conveniently into a large

zoophyte-trough filled with sea-water, and we can thus study it in its living state, which is highly important with delicate structures, such as that we have in hand. The ambulacra are separated from each other by peculiar thin curved calcareous plates, but of considerable width, which are placed side by side all down the under surface of the rays, and from the bottom of the avenues. Between these plates the fleshy arms protrude themselves: now, on cutting open the ray we see that in the interior side of these plates the arms swell out into transparent bulbs filled with sea-water. It is by the contraction of these bodies, forcing, as they then do, the water into them, that the ambulacra are expanded, and on the retraction of the suckers the water is sent back again into the bulbs.

The spaces between the calcareous network are covered with a transparent skin, which can be protruded in the form of a short tentacle. Within these tentacles, which are very transparent, violent vortices are produced by the cilia lining the interior, and whirling round clouds of alimentary particles. It is difficult to conjecture what may be the object of these processes; but from their protrusion and retraction, and being covered and lined with cilia, they are probably connected with respiration. They are distributed all over the upper side of the star-fish, and when protruded (which they can be to the eighth of an inch in a full-sized specimen) give to the animal a peculiar gauze-like appearance.

Interspersed amongst the tentacular bodies, and generally near the spines, are the pedicellariæ, peculiar pincer-like structures, which are constantly opening and shutting during the life of the animal, and of which a great deal has been written, but without any great results: the fact of their not communicating with the interior of the body of the animal has made their object in the economy of the star-fish extremely difficult to imagine. They have been thought by some to be parasites; but there is not the least doubt now, of their belonging to and being part of the animal. These bodies are very numerous in large specimens, particularly towards the sides of the rays, and are often absent in young ones. In this state Forbes says it is the *Asterias clathrata* of Pennant. Around the spines principally, but sometimes in isolated groups, are placed other and very remarkable structures. The investing skin of the animal rises up into mounds, which divide at the top into short tubular processes, each of which ends in a curious opening, like the mouth of a fish. The jaws are formed of hard calcareous matter, transparent like glass, and are broad and short, very unlike the pedicellariæ, which are narrow and long. These mouths are constantly opening a little, and closing again. There appears to be a passage from them down into the interior of the body. I have not seen these curious structures described before, although to me they seem quite, if not more important, than the pedicellariæ, and are much more numerous, there being generally twenty or more around each spine. They are very plentiful near the avenues, where also the pedicellariæ are most abundant Might not the use of the latter be to hold substances to attract swarms of infusoria which might then be taken in with the water by the "fish-mouths," and serve as food for the star-fish in the absence of regular food by the mouth? Constant observation of the living animal under the microscope seems to be the only way of solving this difficult question.

At the top of each ray, and surrounded by spines, is a red spot, consisting of a number of ruby cells in a group. This has been called their eye; but whether it is endowed with the sense of vision is uncertain. It is the only known organ of sense in the star-fish, and seems particularly used when the animal is searching for food; it then always keeps the tips of the rays turned up, exposing well this red spot.

The animal is moderately lively, and will often be seen walking rather faster than a snail. On the sea-coast it seems fond of clinging to the under sides of ledges. At some seasons it is not common, only one or two being seen thrown up by the tide; this more especially in winter. I have seen it in warm weather in great abundance, and this after calm seas. It appears very sensitive to change of temperature; the star-fish in my tank always seeking the deeper parts on the setting in of cold weather; those parts being then of course warmer than the surface.

This species is very voracious, and will eat almost any animal matter. Its manner of feeding is as follows: It is perhaps walking on a piece of rock, turning up the ray-tips and exposing the red "eye" spots, as I before remarked. Should there be a piece of fish or dead worm near, it is soon discovered and drawn by means of the suckers towards the mouth; the body is now raised up to admit the substance, and the rays clasp round it. The body is now much inflated with water, and the stomach is turned out like a transparent bladder, completely enveloping the food; if not too large, it is perhaps drawn quite into the body, there to undergo digestion, and is rejected in a day or so in a finely-divided granulous condition.

In colour this species is very variable, passing from pale lemon down to dark brick-red or violet; in this state having much in common with *Uraster violacea;* and it is often difficult by this means to define the two species.

Forbes seems to question the suicidal propensities of this animal; but there is no doubt of its ability to throw off its rays. I have seen an animal break off all its rays till nothing but the disk was left. This is certain to happen if the star-fish is placed in an ill-aërated aquarium. This habit I

found very annoying when I first attempted to keep this animal; but if it can be kept for a fortnight or so without thus mutilating itself, it seldom after that shows its destructive habits; and if it then dies, it generally does so in an ordinary manner.

There is another malady to which this star-fish seems liable in confinement. The animal may appear healthy and vigorous, but a few white spots will be seen on the rays: these spread; and here it will be observed that the skin is quite rotten, coming away in large flakes. I had always regarded these signs as fatal; but I am happy to say that my friend Mr. O. Meltzer once cured a fine specimen of *Uraster violacea* that was affected in this manner, and which is still alive; the scar is, however, still visible.

Whether this star-fish has any stinging propensities is very doubtful; but I have noticed that whenever this animal has approached a limpet, the great discomfort of the latter was worthy of remark.

I consider from my own experience that this animal is difficult to keep in aquaria. I have kept one over a year, and have now several that I have had for some time; but they have the benefit of continuous streams and daily tides.

HERBERT INGALL.

Champion Grove, Champion Hill.

NEW INTRODUCTIONS.

I AM afraid Mr. Spicer, by his article in the last number of SCIENCE-GOSSIP, will by this time have roused the active wrath of at least some few naturalists whom I could name. And yet I must range myself on his side, and with him ask why our Fauna and Flora may not be enriched, where possible, with the treasures of other climes. There is not the slightest doubt that a very great number of our present species have been introduced by the hand of man, more, perhaps, than is commonly supposed. What are we the worse for it? and why is the naturalist to be at once severely taken to task when he purposes scattering the seeds of some fresh plant or the eggs of some new insect in his locality? I never could understand (but that is probably owing to my limited powers, or else imperfect knowledge) why botanists should be at such immense pains to insist on the necessity of such phrases as "not a native," "a doubtful native," "naturalized," &c. If a plant grows and flourishes in a locality, why may it not be regarded as an inhabitant? If an insect is bred from eggs purposely scattered by man, and the locality being suitable for it, it increases and multiplies, why must it still be regarded as a foreigner? Man himself—in fact every animal—would have to be set down on these principles as "naturalized," but "not a real native," of any locality. If any district possesses the capabilities of nourishing and preserving any species of plant or animal, then evidently the occurrence of such plant or animal, however introduced, cannot be regarded as unnatural. Nature employs certain agents to do her work in dispersion—geological changes, by which paths of dry land may be opened up in fresh places—all the marvellous and beautiful contrivances for scattering seeds—and man is one of her agents too, albeit a conscious one, which appears to be the objection. But surely, if conscious, then a more perfect agent; he cannot oppose Nature, and he can carry out her designs only by obeying the laws which the Creator has impressed upon her; and when he is so doing, he is performing his duty in the same way, though more perfectly, as the plume attached to the tiny seed, or as the breeze conveying invisible germs for hundreds of miles from their birthplace.

Of course it would be of intense interest to know the birthplace and date of arrival of every species we possess; already we can record a great many, and it will be now easy to notice fresh ones. Perhaps some "honourable gentleman opposite" may be able to afford us better reasons for his view of the matter than I have here recorded for mine, and I am sure we shall be very glad to hear them, even if convinced we are wrong. At present the rule appears to be this: if you know the date of arrival, or strongly suspect the date, call the species a "doubtful native," or "naturalized;" if not, it may be regarded as "a true native."

HENRY ULLYETT.

BIRDS! BIRDS!

A WALK through the wood in winter has its charms; the lover of nature finds more scope for the eye; the curtain to a degree is gone; the trees are bare; many birds now may be seen that keep out of view in summer, for, although a number of the best birds migrate, we have some that visit us in winter that are somewhat ornamental, such as the redwing, fieldfare, snipe, widgeon, and several others of the Bunting tribe, *cirl bunting*, *snow bunting*, &c. &c.; besides which we have a number of beautiful birds that stay with us all the year round; the smallest British bird we have, the golden-crested wren, braves the winter; the robin, with his melodious song; the family of Wagtails; hedge-sparrows, stone-chats, whin-chats, &c. &c.

The leaves gone, we get a chance of seeing the mischievous magpie and the pretty jay, the cunning hawfinch that is known to visit orchards, but makes off at the sight of man, seldom leaving cover until evening or next morning, although this bird is known to haunt the vicinity of Hampstead and

Epping forest. I lately saw a new and popular natural history that did not mention this bird.

I one time had a tame magpie that was very sagacious; he would amuse himself by playing with a little dog, running and tumbling round and round a few old trees, only just keeping in front of the dog's nose, seemingly in a half-exhausted state; but when the dog was tired and would run no longer, maggy would look as sprightly as could be; he would throw up his tail, walk back and try to tempt the dog to another run. This took place every morning upon the appearance of the dog, who, after some time, from force of habit, enjoyed the fun as much as the bird. Maggy also had his dislikes, one of which was a red-haired child: he would alight on such a one and pick away most unmercifully. His mischief was mostly a source of amusement to me; but some one thought otherwise, for, while he was stealing grapes—which, by-the-by, was a favourite pastime with him—a boy killed him. Although a great thief, I honoured him with a glass case.

A tame magpie, *not caged*, will get a plumage equal to a wild one; but not so with the jay; there seems a difficulty in the moulting, the feathers not coming to perfection; consequently the health of the bird suffers so much that, coupled with shyness, we lose the real character of the jay when tame. The magpie and jay are both mocking-birds, the former the better of the two. In a garden where either of the above-mentioned birds is kept all small birds are absent.

A crested wren mostly remains in the woods and hedges, however cold the winter may be; yet, kept in a cage, you can scarcely keep it warm enough; it must have a large cage lined with baize, the perch also covered with the same.

The hawfinch, avoiding man as he does when in a wild state, is quite familiar in an aviary; indeed, after a little hard weather many birds that, as a rule, would pine away, may be kept a whole season if room is given them to fly about.

The bullfinch may be kept alive if taken about this time; at other times it is difficult to do so; but it is advisable to keep a pair for a few weeks, after which the hen may be safely removed; they should be fed upon a mixture of hemp and canary seed.

The whole family of wagtails will live in captivity. Although insectivorous, they will do very well if fed upon German paste, giving them occasionally a little live food. Wagtails do not hop, but, like most of the larger birds, walk.

Just now we have very large flocks of siskins, which are known to fly periodically, that is, I believe, every seven years. The siskin, or aberdavine, is an excellent bird to match with the canary; they will assist to build the nest, and help to feed the young. So fascinating is this bird, that frequently the canary will leave one of their own species and pair with the stranger. Like the goldfinch, they are very fond of hemp-seed.

In November I procured a wren, and it seemed to do very well in the aviary, feeding very readily upon small meal-worms and German paste; it was quite amusing and instructive to watch its movements; it would scrub and roll in the gravel much after the manner of the common hen. I am sorry to say it made its escape, and so for a time put an end to the study of the habits of the wren.

CHARLES J. W. RUDD.

SOUTH AFRICAN DIAMONDS.

By PROF. JAMES TENNANT.

THE history of the discovery of diamonds at the Cape of Good Hope was this:—In March, 1867, Dr. Atherstone, of Graham's Town, received by post in an unsealed, unregistered letter, a rough diamond, which had been picked up on a farm in the Hope-town district, and forwarded by Mr. J. O'Reilly to Mr. Lorenzo Boyes, Clerk of the Peace for the district of Colesburg, who sent it to Dr. Atherstone, in order that he might give his opinion as to the probability of its being of any value. He had not seen a rough diamond before, but, after taking the specific gravity, testing the hardness, and examining it by polarized light, he decided that it was a genuine diamond of considerable value; and, perceiving the great importance of such a discovery to the colony, he at once wrote to the Colonial Secretary, suggesting that it should be sent to the Paris exhibition, and afterwards sold for the benefit of the finder. This fortunate person was a Dutch farmer, named Schalk van Niekerk, who, seeing the children of a neighbouring boor playing with some bright stones, was struck by the appearance of one which he offered to buy of the mother. She laughed at the idea of selling the gem, and gave it to him at once. He showed it to Mr. O'Reilly, who was returning from a distant hunting expedition, and so it finally reached Dr. Atherstone. At the close of the Paris Exhibition, the stone was purchased by Sir Philip Wodehouse, then governor of the colony, for £500. Comparing the South African with other diamond-fields, it had hitherto been unusual to receive more than one large diamond—say of 40 carats—in the course of a single year, but the new fields had yielded no less than five stones exceeding this weight within that time. There was one of 56 carats, and another weighing 83 carats, which arrived last year, and proved to be an exceedingly beautiful stone. It is now in the possession of Messrs. Hunt and Roskell, who have kindly promised to allow any one who wished to see it. I anticipate that we shall have diamonds from this region exceeding the Koh-i-noor in size, and equalling it in beauty when cut and polished.

The diamond-bearing district of South Africa is, as far as yet known, confined to the Vaal Valley, some of its tributaries, and a part of the Orange River, below its junction with the Vaal. For the most part, the district of Colesberg, Albania, and Orange River Free State (which include most of the diamond-diggings) have the Karoo strata, or great Dicynodon formation, that underlies so large a part of the Cape Colony, for its basement, traversed in every direction by dykes of greenstone and other volcanic rocks. Along the Vaal River, however, the Karoo beds, if they ever extended quite so far, have been denuded off, leaving some schistose and shaly beds, traversed by basalt and other volcanic rocks; and these may be either remnants of the Karoo beds, or some of the palæozoic rocks beneath. Excepting occasional exposures, all these are covered

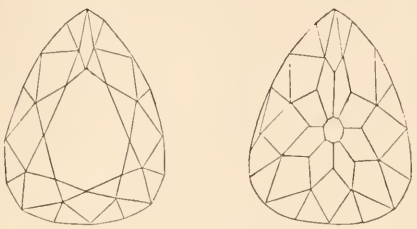


Fig. 11. Diamond "Star of South Africa," face and back as cut.

with superficial deposits of tufa, pebbles, and sand. The pebbles consist of rock crystal of various colours, agate, jaspers (black, red, and ribboned), quartzite, sandstone, iron-ore, basalt, granite, garnet, spinel, peridot, blue corundum, and diamonds. Where the quartz is angular instead of rounded, diamonds are said to be wanting. The superficial sand and soil, generally ferruginous, and even the tufa, have also been found to contain diamonds here and there. The diamond-bearing pebble-bed is formed, not only on the flats along the river, but also on the tops and sides of the hills ("kopjes"), sometimes one hundred feet and more in height, within a few miles of the river. Most of the pebbles have been probably derived from the Quathlamba Mountains or Drackenberg range, which has certainly in its constitution all the materials for the common pebbles, and probably the rarer minerals also. The strata that have before now occupied the place of the Vaal Valley may have yielded some of the material, slowly let down from level to level, and pushed gradually forward, as the strata were worn away by water through great periods of time; certainly the presence of the pebbly accumulations on the kopjes indicates the existence of former levels of water-worn deposits, portions only of which now remain after the erosive action of the rivers. These kopjes seem to be harder masses of protruding basalt than the rest, and are said to have rich stores of diamonds remaining in the old alluvium coating their tops and sides, but often hidden by sand drifted from flats. The association of agates points of course to volcanic rock, even if no basalt or greenstone had been found; and the abundant evidence of igneous action, both in the Vaal Valley and in the watershed whence the river comes, may probably have had to do with the origin of the diamond, in changing coal or some other carbonaceous compound into pure and simple crystals of carbon.

The many papers in the Colonial and other periodicals, by Atherstone, Rubidge, Gilfillan, Higson, Shaw, Muskett, Grey, and others, have been the chief sources of this information concerning the diamond fields collated for me by my friend Professor Rupert Jones.

As in South Africa, so in Brazil and India, diamonds have been formed in superficial pebble-beds, whether loose or conglomerated, containing quartz and other hard rocks, derived probably from mountains many miles away, of palæozoic and highly altered rocks. It is difficult, however, to make an exact comparison of the pebbly alluviums, so rich with diamonds, in these three countries. So also of South Australia the same may be said; and doubtless diamonds will be found under similar conditions in other parts of the world.—*Lecture at Society of Arts.*

DARKLING SPIDERS.

DID it ever occur to any naturalist that it is a rather singular circumstance that spiders should spin their webs in closets or places which are entirely dark? For what purpose is the silken snare spread by these crustaceans? We naturally answer, that its primary object must be to entrap winged insects, yet totally dark places yield few of these. Observe that I am speaking of spots where light is not intermittent, but from which it is shut out for months together. I have recently been making some investigations relative to the habits of spiders resident in a closet which is not opened for many weeks at a time, situate on the basement of a house. Within this a spider might well despair of getting a good living, unless it had either capacities with which spiders do not appear to be gifted, or possessed the art of subsisting upon other aliment than that which we assume, with good reason, is that which has been assigned them by Nature.

What insect is likely to fly about in a dark closet? The chances of any entering at those rare intervals when the door was open would afford a meagre livelihood to any spider, even if these visitants, once shut in, were likely to blunder about until they fell into a snare; but here were many spiders, and from their appearance they showed evidently that they

were not in a state of starvation. Could they replenish their larders by the capture of any flying insects actually bred within their domain, and which, being prisoners in the dark, and within a limited space, would be likely to be caught? Scarcely. The closet was almost empty—a few old bottles and jars, some pieces of wood of a variety of sizes, and a débris of sawdust and other dust, the accumulation of years, occupied the floor. This was not likely to produce anything winged, save, perhaps, a few TINEÆ, the larvæ of which might feed on the wood, though the wings of no insect of this sort appeared in the webs. Other living creatures were not to be looked for, saving any of the small wood-boring beetles and wood-lice, and these would not be very likely to enter a spider's web, nor to remain long in it if they did. The webs, I perceived, were regularly arranged in the angles on each side of the door, which occupied almost the entire width of the closet. Scarcely any webs were situated in any other part of the closet, and this seemed to suggest either that the spiders had stationed themselves there with the expectation of catching any visitants at their first entry, or else that they themselves were accustomed to make excursions in search of food elsewhere, retiring to these webs, which might be called "their homes," at such times as they chose. This idea was favoured by three circumstances; first, that a portion of the webs was occasionally unoccupied; secondly, that a sufficient gap was left, when the door was shut, to allow the issue therefrom of a house spider of average size; and thirdly, it is, I believe, a fact that house spiders are not unfrequently to be found wandering about, especially at night. With the skill for which these creatures are so noteworthy, the habitants on each side of the door had adapted their webs to the space at their disposal. On one side, where there was a width of several inches, the webs were largish and irregular; on the other, the quarters being narrow, they were small and almost triangular. Here also they were more numerous, and their close proximity to each other, and the few spiders to be seen on this side, as compared with the other, might indicate that two or three of these were constructed by the same spider.

The long seclusion enjoyed by these individuals now experienced an interruption. I paid several visits at short intervals to observe somewhat of their economy. I found that several of those near the opening of the door (where the narrow space was) extended a portion of web across the door, so as in this way, to give themselves a chance of catching any insect which might crawl through. These being severed, were speedily renewed, even in the space of a few hours. My examinations were repeated, with the view chiefly of ascertaining what captures were actually made by the spiders in this situation, though at this season (November) it was doubtful whether they would secure much prey, and their summer victims had evidently been entirely demolished. The deposit of dust upon most of the webs was considerable, proving their antiquity—I assume that the life of a spider may be prolonged through several years—and also making it evident that any crawling creature would have very little difficulty in making its escape from them, a tolerably good foothold being thus afforded. Scarcely a web also was without a rejected skin of the tenant, and some contained two or three. Specimens of the domestic fly are not very easily picked up in November; but, finding a plump one in lively condition, I placed it in a web. The occupant looked at it with the sort of bewildered astonishment that a person manifests when he is suddenly informed that a thumping legacy has been left him by a stranger, and, after some consideration, walked up leisurely to it, and secured it. The appearance of most of the spiders did not indicate at all that they were in a starving condition, though how they exist through the winter is doubtful, I conjecture that within doors they rarely become torpid, as appears to be the case with most of our out-door species, both "hunters" and "weavers." J. R. S. CLIFFORD.

MY CRASS.

DO write, in SCIENCE-GOSSIP, about my Crass. It was precious 'cheeky' of you to say, when you wrote in *Land and Water* about the Beaumaris oyster-beds, that I wanted to pocket some of the oysters, but *you may* write about my Crass, Mamma."

The permission, offered in such a polite manner, I am inclined to avail myself of, as I like to see little boys take an interest in natural history; but the kind Editor of SCIENCE-GOSSIP may not consider your Crass such wonderful members of scientific society as you do, and refuse to give them a place in his magazine.

The "My Crass" alluded to are two enormous specimens of the *Bemodes crassicornis*, or thick-horned sea anemone, found on the shore near here. One was brought me by a fisher lad; the other was found by my boy and a young friend of his, close to the oyster-beds at the point, attached to a large piece of stone. The boys, very wisely, did not attempt to remove it from its moorings, but carried off between them the miniature rock and all. It now stands in my sitting-room, in the centre of a large brown pan full of sea-water, which is constantly changed; and it affords no little amusement to its owner, I can tell you, to watch its various transformations.

I was called off from my work, yesterday morning, to "see the big crab" that had suddenly put in an

appearance. The Crass had evidently dined, just before his capture, on a crab quite as large in circumference as half a crown; for, at the moment I appeared, he was disgorging the *empty* shell, and he had not been treated to *Crustacea* by us. Minced beef, given "rare," as they say in New York, and an oyster—out of the shell, of course—are the articles of diet we have given his crass-ship. I fear he will die of repletion, for my boy has an idea that he requires constant feeding. Fortunately, the creature has a first-rate digestion.

The other Crass inhabits a smaller mansion, and is a trifle less voracious. I do not like to put either of them in a new aquarium which I have just purchased of Mr. Edwards, of Menai Bridge, the gentleman who supplied Mr. Alford Lloyd with all those—or at any rate a great many of them—nice slate tanks he used to have at his establishment in Town, a few years ago; for Crass are rather uncertain zoophytes, and, if they die, will poison a whole aquarium. Besides this, they are almost as dangerous when living: they help themselves to any neighbour that comes within reach of their long arms (*tentacula*).

I have a great aversion to feed them with living animals. I do not like to see one creature prey upon another, although I know it is in accordance with the universal law of Nature; so I will not let my boy give his pets small crabs and shrimps. This will probably be called "very silly," and I shall perhaps be asked if I never eat crabs and shrimps myself? Yes, I do; but then they are boiled, and I can but hope the process is less painful than being buried alive in the interior of a Crass; besides, I do not superintend the boiling, and I should be expected to witness the entombment, or have to listen to such remarks as the following:—"There, now his claws are gone," or, "Half of him is out of sight: how he does kick!"

Crass are more sensitive than the other kinds of sea anemones, and therefore, when the stone on which they have fixed themselves is too large to carry away, especial care must be taken in detaching them, as an injury to the base is fatal.

Has it been really found out how long these living flowers can live? I once read an account of a Crass that had existed for thirty-five years. If, as it is said, much locomotion shortens life, Crasses ought to be perfectly patriarchal. They travel by a very slow train: only run at the rate of four inches in eight hours. They move a portion of their base, and then drag the other part quietly after it. Were it not for the strong expanding and also prehensile power of their tentacles, they would run great risk of fasting, since they cannot change their hunting-ground often or rapidly. "My Crass" took a pretty tight grasp of the paper-knife I touched him with to-day. I could feel it, just as one does the force of a loadstone when it attracts an object held in the hand.

"My Crasses" have names. We have called them Miss S. and Mrs. M. W.; for, although I write of them as if they belonged to the masculine gender, they are named after two members of the feminine, whom we fancy they resemble. Strictly speaking, I imagine they are neither, as their young are produced like flower-buds; only, flower-buds, when expanded, wither and fall off to die: these sea flower-buds, when their form is perfected, fall off, or out, to live, and grow, on their own base. Has it ever struck you how some animals resemble human beings? (I ought to have written human beings first). One of these Crasses, when in a state of sulk, sticks out two singular earlike appendages, forcibly calling to mind the way in which Miss S. used to wear her hair, drawn up in two horns, one on each side of her head. The other Crass has a large, wide expanse of face, with wonderfully long, light-hued tentacles; and each time I look at the animal since my naughty "Puck" gave it "a local habitation and a name," I fancy I see Mrs. M. W., her light locks streaming in the wind, as she, with crasslike celerity of motion, made her way up Cintra Hill.

The colours of some the sea anemones are very brilliant when seen in strong sunlight, and their resemblance to flowers, such as asters, daisies, and marigolds, perfectly startling. They may well be called "the sensitive plants of the sea."

I am busy making a collection of different polypes, or zoophytes, in readiness for the time when my aquarium will be fit to receive them. There are a great many specimens on this coast, and I trust to find others at Llandudno during the holidays, when I trust I shall have something of greater interest to gossip about than "My Crass."

I am told that the tentacles are charged with a poisonous fluid, which kills the prey directly it is seized. Judging from the stinging, strange sensation in my fingers after touching these said "feelers," I half imagine them charged with *electricity*.

Beaumaris. HELEN E. WATNEY.

P.S.—Since writing the above, one of "My Crass" has devoured a good-sized purple-tipped sea-urchin, which was put by mistake into his house. I hope the species will disagree with him.

SECTIONS OF BONE, TEETH, &c.

DOUBTLESS many of the readers of SCIENCE-GOSSIP have tried, with more or less success or failure, the methods described in the manuals for making sections of bone, &c.; and many have either been deterred from studying such structures through the time involved in making even respectable slides, or felt, where they had succeeded, that their productions would not compare with the admirable sections of our professional mounters.

Again, in order that the *lacunæ* and *canaliculi*

might be clearly seen, bone sections had to be mounted dry—a fertile source of after-annoyance, as many have found in a plentiful crop of fungus-growth, which either disintegrated the section or spoilt the slide. Many slides of bone, teeth, scales, &c., prepared in the dry way by recognized mounters, in my cabinet are so affected. A similar annoyance led Dr. Ormerod, of Brighton, to try a modification of a method of mounting described by Dr. Carpenter, together with a novel method of grinding the section.

About three months since Dr. Ormerod kindly showed me his process, and gave me permission to describe and illustrate it at a microscopical meeting of the Brighton and Sussex Natural History Society. Several who saw the process have since tried, and found it a perfect success. Its chief recommendations are simplicity, rapidity, permanence, and good results. It succeeds not only with bone, teeth, ivory, and similar structures, but also with the hard shells of some fruits, and the stones of nuts, plums, &c.

The materials required are pieces of ground glass (coarse better than fine) about 6 inches square, pumice-stone with a flat surface, a coarse stone or grindstone, and a fine saw. First cut as thin a slice as possible with a fine saw (I use a common fret saw), then roughly rub down on the coarse stone or grindstone; now, using the pumice-stone as a pad, rub down as thin as required, with water on the ground glass, employing a rotatory motion (the sections need not be ground so thin as for dry mounting); well wash with water, and the section is now ready for mounting.

On a glass slide boil some Canada balsam (old is better than new); do the same on a glass cover. When both are nearly cold, remove with blotting-paper the superfluous moisture from the section; place it on the glass slide, on the nearly cool balsam; lay on the glass cover, warm over the lamp, and press down the cover. As soon as cold, run a hot knife round the cover, and clean off the superfluous balsam with the knife *under water*—a method which, to those who have not tried it, will be a pleasant surprise. The slide may now be labelled, and placed in the cabinet.

With practice, from the time of cutting the slice till the slide is ready for the cabinet, about half an hour will have elapsed. I have completed some in twenty minutes; ivory and teeth being tougher, will take a little more time than ordinary bone sections. Compare this with the time and trouble under the ordinary methods, and when it is added the results are equally satisfactory, and the permanence of the specimen is secured by the mounting in balsam, microscopists will recognize its advantages; the moist surface prevents the thick balsam running in and filling up the *lacunæ* and *canaliculi*. In practice I cut several sections; as time and opportunity allow, I rub down and finish on the ground glass, and leave them in water until I can find time to mount, and then complete the process. The other evening I mounted sixteen slides in an hour and a half, of bone, teeth, and ivory, which had been rubbed down at odd moments during the week. In the case of ivory, especially hippopotamus, and teeth, a file reduces the thickness quicker than the coarse stone.

As mentioned before, the saving of time to the histologist is a very great point, few having the leisure to afford hours over the grinding, &c., inseparable from the other methods.

Brighton, December, 1870. T. W. Wonfor.

ARTIFICIAL SWARMING OF BEES.

ALTHOUGH bees are mostly allowed to swarm of their own accord, artificial swarming is very profitable. What is more common than to see thousands of bees clustering idly for a week or two together about the outside of a stock hive, in the very best honey-gathering season? It is certainly a profit if we can set those idlers to work in a new hive; besides, by drawing them earlier than they would swarm if left to natural instinct, you have earlier swarms, save a deal of trouble in watching them swarming, and do not run any risk of hives flying away, as a great many do that come off by their own accord. I am convinced that, if this method was more generally adopted, more working-men would become bee-masters. The natural swarming-time of the day being when they are away at their work, they consider they run a great risk of losing their swarms. I will now give a few simple directions for Artificial Swarming, whereby the most timid among bees may draw a swarm in a few minutes, and rarely even get a sting. I never use veil, gloves, nor bee-dress of any description; and yet, although I work a good deal among them, it is very rarely I ever get a sting. Commence operations by blowing a little tobacco or fustian rag smoke in at the doorway of the stock.hive you intend to draw the swarm from; lift it from itsst and and turn it upside down, a little distance from where it stood; then lay your empty hive on the top of it, mouth to mouth. If nearly of the same size, tie a sheet firmly round the junction to prevent bees escaping to annoy you; or if different sizes, you should be prepared with a round board—say 24 inches in diameter,with a 14-inch diameter round hole in the centre thereof, to lay between them during the time that you are drawing them. I mention this size because it is likely to fit drawings from any size. After you are sure that you have the hives so well closed up that they cannot escape between them, take two sticks and give your under one, that is, the stock hive, some sharp raps, say from three to five minutes; by that time you should have

plenty up into the empty one, but will know from the hum if there is plenty. The queen is among the first to run—so that you are sure that you have her—into the empty one. Set your new swarm where the old stock hive stood, setting the old one a few yards distant to either side; contract the entrance till they get stronger, to prevent their stronger neighbours from plundering them. The best time for this operation is about five or six o'clock, in the month of May or June, when the bees have mostly returned from the fields. I have tried them in the morning, but I found that there was mostly a stir among them then; but when done at night they are quietly settled and at work in the morning, the same as if nothing had happened. Do not be alarmed although there are not many working in the old stock for a few days, for it will require the most of them left to nurse the brood for about a week. Or, another way of drawing a hive:—Take a strong lying-out hive, cut a small piece of comb with eggs in it out of some other hive, where you have a healthy queen, fixing it in the top of your empty hive; then lift your lying-out stock hive about midday, when the most of the bees are in the fields, and put the empty one down on its stand, making it as like the old one in outward appearance as you possibly can, setting your stock down in some other place of your apiary. The bees returning from the fields will appear a little confused, going in and out, flying about a little, but will soon settle and rear a queen out of the eggs you put in with the comb.

At page 278 of your last number, Mr. C. H. George says that he thought it was already thoroughly proved and universally acknowledged that bees' eggs when laid were of different sexes. Now, I am of the opinion that they are all one sex when laid, and that the bees can rear queens out of eggs either laid in drone or workers' cells if taken from a healthy well-doing hive. I am surprised that such an easily tested point regarding bees remains disputed, and trust that some of your bee-keeping readers will try the simple experiment, publishing the results during next summer. He says that in the year 1868 he saw drones unusually early at a hive, which excited his suspicions of the capabilities of his queen. I will explain the cause of his queen producing only drones. The hive that she was in would lose their queen some time in the month of September preceding, when there were still eggs; but by the time that they reared a young queen from the workers' eggs the drones would all be killed; therefore she would not be fertilized. Consequently, all the eggs that ever she would lay would produce drones; if laid in workers' cells they would be small ones, little larger than the working bee, and those in the drone cells would just be like common drones. He says that on the 5th of June he drove his hive and gave them a piece of worker comb containing eggs from a pure Ligurian stock, and his bees only attempted to raise one queen, in which they were successful. I think that this proves that they are of one sex when laid, or how could they raise a queen from a worker's egg? He further says, "She had the characteristic marks of the Ligurian, but was very small, and turned, much to his surprise, a drone-breeder, &c." The cause of this was that his young queen was not fecundated;—drones produced from an unfertilized queen, and there would only be that sort in his hive. And he further says "that on the 15th of July he removed a queen from a black stock of bees, and on the 23rd of the same month he destroyed every queen cell, giving it a piece of worker comb containing eggs and brood in all stages. From this breeder the bees formed many queens' cells; but every cell produced a drone, &c." Now eggs of unfertilized queens cannot be changed by the workers; so that was not a fair experiment to test whether the eggs were all one sex or not (page 282).

Mr. "E. G. W." mentions he would like to hear more of the iron cover invented by me, which I herewith give; they are made of sheet iron well painted inside and out.

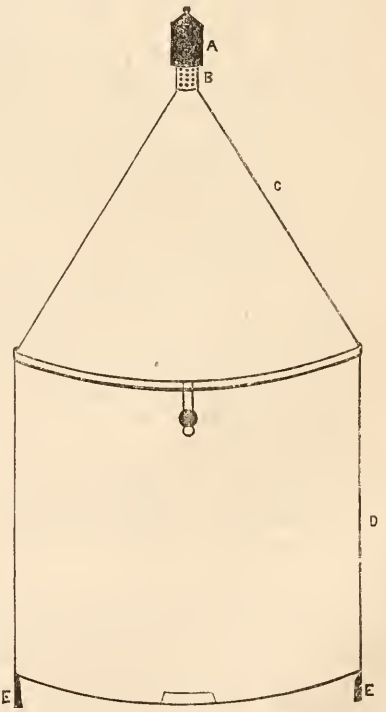


Fig. 12. Hive-cover.

a. The cover for ventilator to draw up and down as it may be required.
b. The ventilator; small holes pierced in the sides of it to admit of air.
c. The lid of the cover hinged at the back, with a hasp for a padlock at front.
d. The body of the cover.
e, e. Hasps fixed to the cover, with a hole in them to admit of a bolt to go through below floor-board, so that you can lock the whole together.

Whatever size your hives are, the covers should be about two inches in diameter larger, to admit of some dry hay between the cover and hive during winter. Since mentioning them in the November number, I have got a few made for gentlemen in different parts of the United Kingdom; they have only to be seen to bring them into general use; they are so much superior to any that have hitherto been tried to cover hives.

I will send any person particulars about them through the post that does not fairly understand; but they are so simple in their construction that any tinman could make them.

Whitburn, Linlithgowshire. JOHN MCLURE.

ZOOLOGY.

ANCHOVIES.—Mr. Frank Buckland, who has received a sample of fish that had been caught in large quantities on the Devonshire coasts the last two or three weeks, pronounces them to be certainly anchovies. He adds that they are probably wanderers from the Bay of Biscay.—*H. Budge.*

LIMNÆA GLABRA (*Mull*).—Some time ago I found a locality for this species here. It was a small pond, and was quite dry when I took some of the shells living, on the 12th of June. It was still dry when I collected some more on the 13th of August. The shells taken on the latter occasion revived on being put in the water. As evidence that water had not lain in the pond during the intervening two months, I may add that I found a living chrysalis of a Noctua, and many land beetles, with other insects, under the dead water-plants where the *L. glabra* had taken refuge. On the 29th of November I found a little water in the pond, and a dip of the net produced *L. glabra* alive and crawling. I fancy the pond was dry much longer than two months, this summer. At any rate, this drought did not kill *L. glabra*, which was the only shell in this pond. Another one, a short distance off, contained many *Limnæa peregra* and *Sphærium lacustre*, which were all killed by the drying-up of their pond.—*Harry C. Leslie, Erith.*

A SHARK'S MEAL.—I copy the following from the *West Briton* of Nov. 17th. Some of our readers will recollect the loss of the barque *Nelson* on a ridge of the dangerous Seven Stones, between the Land's End and Scilly. Her stern burst as she foundered, taking down with her a cargo of lead ore and esparto grass, and the captain, his nephew, and the mate. This explosion of the after-part of the barque, and her subsequent breaking-up, must have permitted access to her cargo and stores. A few days afterwards, the Seven Stones light-ship men, whose vessel is three miles from the spot where the *Nelson* went down, hooked a shark about 5½ ft. long. On opening the marine pirate, there was found in him a whole rat, a large lump of beef, and a quantity of esparto grass.—*H. Budge.*

LEPORIDS.—Until reading Mr. Spicer's communication in the November number of SCIENCE-GOSSIP, I quite thought all naturalists were of opinion that the Leporid was not a hybrid between the rabbit and hare. I think the experiment to make them pair has been tried at the Zoological Gardens without success. It does not appear very likely that animals which in some respects differ so widely from each other should breed, and still more unlikely that their young should be fertile, as is the case with the Leporids.—*H. Budge.*

HAIR-TAIL (*Trichiurus lepturus*).—Allow me, through your columns, to make known the capture of a specimen of that rare fish *Trichiurus lepturus*, or Hair tail. It was brought to me this morning (Dec. 10) by a fisherman, who found it in his herring-net. The dimensions of the fish were:—Length, 2 ft. 5 in.; depth, 2 in.; length of gill-cover, 4 in.; of pectoral fin, 1½ in. My specimen corresponded with the descriptions and figures of Yarrell and Couch, and I have no doubt of its being a veritable Trichiurus.—*Julia Colson, Swanage, Dorsetshire.*

OTTERS.—On the 23rd November last, a keeper of the Angling Association captured a fine pair of otters on the river Bollin, a little below Ashley Mill, Cheshire. The male weighed 13¾ lb., and was 41 inches in length; the female weighed 14 lb., length 42 inches.—*G. H. H.*

ANTS.—Mr. Frederick Smith, the eminent entomologist, of the Zoological department, British Museum, has kindly informed me, after having seen a specimen out of my formicary, that the species whose habits I described in the November number of SCIENCE-GOSSIP is not *Formica fusca*, but *F. nigra.*—*Edward Fentone Elwin, Booton, Norwich.*

DRAGON-FLIES IN THE METROPOLIS.—I have myself observed such occasional instances as that noted by Mr. Harry (SCIENCE-GOSSIP, 1870, p. 262), but I am doubtful whether the wings of the insects have been the means of bringing them into these unlikely places. When it comes to a distance of several miles from any water where the preparatory stages would be likely to be passed, I must confess that I seek some other explanation. Dragon-flies are strong and rapid fliers, it is true, and eager for their prey; yet I have rarely found them in the country at any considerable distance from their native pond or ditch; least of all, is it likely that they would fly in a direction which would promise them but little sport. Now it must

be remembered that every day, especially in the summer season, a number of insects are brought into London by a variety of agencies against their own will. An instance particularly well marked, is that furnished by the multitudinous trains reaching the metropolis from rural districts. The carriages, after remaining for a time in the sidings of stations, surrounded by vegetable life, become the resort of moths, flies, and other species, which subsequently perform long or short journeys without paying any fares! But the appearance of a dragon-fly in town may, I believe, be thus explained:—Amongst the quantity of garden and field produce brought into London, reeds and rushes are occasionally to be found, being used as packing. Now attached to the stems of these there are at times various aquatic *pupæ*. That of some dragon-fly is likely enough to occur sometimes; and the insect thus travelling, if uninjured, would subsequently emerge in the winged state, and flit its little hour amongst the bustle of streets.—*J. R. S. C.*

A Likely Story.—Naturalists were a little unscrupulous formerly, and the public too gullible, or the following could not have been gravely printed in an old magazine—a type of not a few outrageous fictions which were received without question by those ignorant of the rudiments of Natural History. In the *Mirror* of the year 1824 it is reported:—

"Lieutenant Hebestreit has discovered the means of employing a kind of caterpillar in spinning a fine web, which is perfectly white and waterproof. With this web he lately constructed a balloon, which he inflated by burning spirits of wine under it, and which ascended in the large hall which serves as a workshop for his caterpillars. He can make them trace ciphers and figures in their web. For this purpose he draws the outline of his design with spirits of wine, which the caterpillars avoid and spin round it. A web, 7 feet square (!), perfectly pure, and as brilliant as taffety, was the result of three weeks' labour of about 500 caterpillars. The subject is not unworthy the attention of natural philosophers."

They must have been naturals, indeed, *Scottice*, if they could accept this lieutenant's narrative.

Baby Spiders.—A short time since my attention was attracted by some dark object suspended against the outer wall of the house, in a sheltered corner, which, on examination, proved to be a mass of tiny spiders. The little creatures were hanging by a few threads of web of exquisite fineness, so as not to quite touch the wall. They were congregated in a dense cluster, as large as a good-sized walnut, and must have been many hundreds in number. They were pale yellow, with a dark spot on the hinder part of the body. It was on the 22nd of May that I first saw them, and they remained without especial alteration till the 27th; the weather being fine and dry. On the morning of that day they were all astir, and in a few hours had formed a ladder of web reaching to the ledge of a small window about a yard above the spot where they hung. By this they all mounted, and from thence formed another, reaching up about another yard, to the projecting slates which covered a water-tank, under shelter of which they ensconced themselves in a dense cluster as before. In the afternoon of that day some slight showers fell, and the next, the 28th, was a day of heavy rain without intermission; but the wonderful instinct of my tiny friends had led them to a place of perfect shelter. Let rain and wind drive as they would, nothing could reach them beneath the wide flat slates under which they had taken refuge. The next day it was most amusing to see the many scouts who went on exploring expeditions to the edge of their hiding-place; but they did not seem to bring back any satisfactory tidings till the 1st of June, when again all were in action; and, in a few hours, a third ladder was formed, reaching this time to the roof of the house, to which in the course of the day they all mounted, and were, alas! lost to my view. How did these baby spiders live and thrive? I never saw any larger spider near them, and they made no web, properly so called; indeed, if they had, anything which they might have entrapped larger than a midge would have been beyond their powers. Did sun and air, and the warmth supplied by their close contact, suffice for their nourishment? Or do the young of the spider, when first hatched, possess some of that substance which is, I believe, called in full-grown specimens, the "fat-body," and which enables them to endure long fasts, on somewhat the same principle as a hybernating animal? I was sorry to lose sight of these interesting little creatures before I could ascertain how long they would remain thus associated before beginning an independent existence. I have not yet detected any webs in the garden, or near the house, which appear to be occupied by any of my much-regretted little friends.—*F. T.*

Plumed Gnat.—In *one* of our bedrooms, for the last fortnight or more, swarms of Plumed Gnats are seen upon the window panes. This is confined to the one room. Can you explain it? Where do these gnats propagate? We have no water near, or a chalky soil, nearly ninety feet in the depth of well. The room faces south. There are two other windows in the same line, and none are seen there.—*J. P. G.*

The Robin.—Can any reader of Science-Gossip inform me who was the author of the nursery ballad called "The Death of Cock Robin," and when it was first printed?—*G. R.*

BOTANY.

Goldilocks.—It may be worth noticing that on December 12th, after some severe weather and many nights of frost, I picked a flourishing stem of Goldilocks (*Ranunculus auricomus*), with two full-blown bright yellow blossoms upon it, which had been growing in a hedgerow, under no peculiar shelter.—*C. W. Bingham, Binghams Melcombe, Dorchester.*

Loose-strife (p. 237).—"T. R." will find what he wishes in Pliny (Hist. Nat., xxv. 35 and xxvi. 83, 93), where it is said that oxen which will not draw peacefully together in the same yoke, may be rendered submissive by putting branches of this plant on their back. It may be mentioned, however, that Pliny speaks probably of *Lythrum Salicaria* (spiked purpled Loose-strife), the astringent properties of which are said to have been discovered by a Greek physician called *Lysimachos*, so that there might be another origin of this name. The English *Loose-strife*, as well as the German *Haderlos* (Kittel's "Flora"), belong both to a class of new-made plant-names which appear to me altogether a failure. They are no true vernacular names, though in some cases they may acquire a certain degree of popularity. When a boy, I knew *Lysimachia vulgaris* as *Gelber Weiderich* (yellow willow-weed), *Lythrum Salicaria* as *Rother Weiderich* (red willow-weed). The two genera are not distinguished in the language of the people, and names as Kittel's *Haderlos* would be to my Silesian countrymen as unintelligible as if they were Chinese. Is not the English *Loose-strife* in the same case?—*A. Ernst, Caracas, Venezuela.*

The Myrtle.—Fable informs us that the Greeks named this tree Μύρτος, from Myrsine, an Athenian damsel, who, being overcome in wrestling and the race by Pallas, died of envy; but, being a favourite of Minerva, she was metamorphosed into a myrtle-tree, which the goddess held next in esteem to her sacred olive; but Pœna says it was so named from the fragrance of the berries and plant nearly resembling the celebrated odour of *myrrha*, myrrh. —*Sylva Florifera.*

The Marygold.—The Tagetes appears to have been introduced into this country as long back as the year 1573, and we conclude that they were called French Marygolds from our having first received the seed from France. Gerard says the African Marygold was first obtained "when Charles I., Emperour of Rome, made a famous conquest of Tunis; whereupon it was called *Flos Africanus*, or *Flos Tunetensis*." But as these plants do not grow naturally in Africa, we may conclude that they were first received in Spain from South America, about the time Charles returned from the coast of Africa; and, in compliment to that monarch for having given liberty to twenty-two thousand Christian slaves, they were called African Marygolds.—*Flora Historica.*

Early Gardeners.—The monastic buildings appear to have been almost the only dwellings to which orchards and vineyards were attached previously to the reign of Henry VIII. But it was under that monarch and Elizabeth that the most valuable fruits were introduced into this country; for at that time, the desire of discovery pervading England, many fruits, plants, and vegetables, hitherto unknown, were brought hither from the New World. So little does horticulture seem to have advanced prior to that period, that Queen Catherine was obliged to procure her salads from Holland; and, according to Fuller, green peas were seldom seen, except from that country. "These," says he, "were dainties for ladies, they came so far and cost so dear."—*Phillips, Fruits of Great Britain.*

The Lotus.—A misprint may probably be detected at p. 272, where, in lines 4, 5 of this article, the word "antiquity" does duty for *ambiguity*. To sum the matter up, whilst waiting for more light, we have evidence of—1. The *Nelumbium speciosum*, a liliaceous, bean-producing plant, which was used by the ancient Egyptians in various ways, though not now found in that country. Herodotus describes it, and it has been specifically called the Egyptian bean, used, it is said, for lustration to Isis, the goddess of fecundity; the bean fitly illustrating vegetable growth. This is a *quasi*-sacred use. 2. *Nymphæa Lotus* and *N. cærulea*, the common white and blue lilies of the Nile; still abundant there, and freely represented in Egyptian interiors as a favourite adjunct of all feasts and festivals, and *sacred* to Nofre Atmoo. Here is evidence that the Lotus, of various kinds, did really hold a semi-sacred position, as generally supposed, although full proof the exact species may still be wanting. I now add that the lotus-flower appears in the hands of seated figures, when feasting, in later Assyrian sculptures, just as in Egypt. (*Vide* Rawlinson's "Ancient Monarchies," vol. ii. fig. 117, which the reverend professor, at p. 109, styles "the lotus, or *sacred* flower.") Without desiring to press indecorously upon C. V. W. or C. F. W. (qy.), I think that he should withdraw *one* expression. He says, "The 'lotus' was a 'sacred' flower among the Egyptians, as an emblem of a certain god; just, may be, as the 'rose' is sacred among us." This position is untenable, and the parallel altogether fails. We have no god to whom the rose is sacred, nor do we worship a "great goddess Britannia," in the same sense that Nofre Atmoo was worshipped, nor, indeed, in any sense but a jocular one, which is no worship at all.—*A. H.*

MICROSCOPY.

Scale of Golden Carp (*Cyprinus auratus*).—In order that our series of figures of the scales of Carp may be rendered more complete, we give that

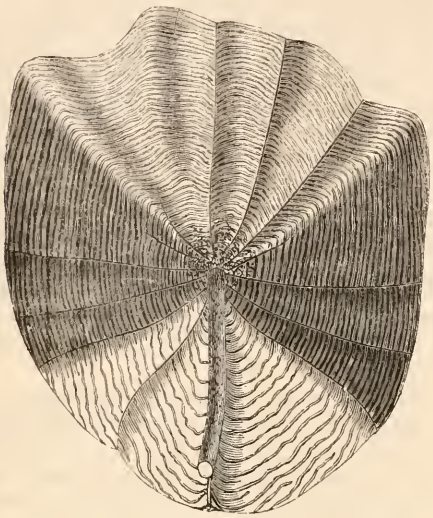


Fig. 13. Scale of Golden Carp.

of the Gold-fish, or Golden Carp, too well known to need description. There are one or two others which will be furnished as soon as we obtain well-authenticated specimens.

Cells.—In last month's number of Science-Gossip there are some remarks on mounting opaque objects in cells with loose covers. At the request of our section I forward you a couple of specimens of a new slide for this purpose, invented by Mr. Aylward, one of our members. These slides are made of wood, the size of ordinary glass slips (3 × 1), and about the same thickness. The cell is sunk in the centre, and admits of a copper cap being placed on an inner ring; the outer groove is bevelled off to allow space for the fingers and thumb to remove the cap. The way to remove the cap is to grasp the milled edge with the nails of the two first fingers and thumb, and to turn as if to unscrew it, at the same time drawing it off. The cap should be slightly turned when replaced. The advantages of these slides consist in their being so thin, and in having a loose cover. As the effects of mounting objects in permanently-closed cells were so well described by your correspondent, the utility of this cell is obvious.—*W. Jackson, Hon. Sec. Manchester Nat. Hist. Society.*

Eel-Pout (*Lota vulgaris*).—The Burbott, Burbot, or Eel-pout, belongs to the Codfish family, and the only one found in fresh water. It is not common in Britain, being confined to the north-east of England, and is absent from Scotland and Ireland. A very good account of this fish will be found in

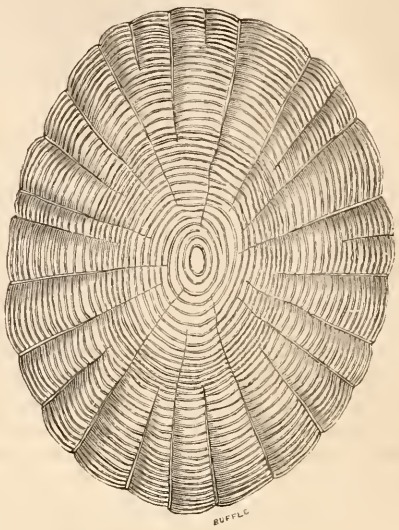


Fig. 14. Scale of Eel-Pout.

"Couch's British Fishes," vol. iii. page 93. We give a figure of the scale more than usually magnified, since it is very small and delicate. The Eel-pout is quite a lover of northern regions, since it is found in Sweden and other places in the north of Europe, as well as northern Asia.

Preserving Algæ, &c.—For the preservation of mosses, algæ, &c., Dean's compound is much used, and considered one of the best media. The specimen to be mounted should be immersed in the compound, which must be kept fluid by the vessel containing it being placed in hot water. In this state the whole should be submitted to the action of the air-pump, as it is not an easy matter to get rid of the bubbles which form in and around the objects. The cell and slide must be warmed; and heat will also be necessary to render the gelatine, &c., fluid enough to flow from the stock-bottle. The cell may then be filled with the compound, and the specimen immersed in it. A thin glass cover must then be warmed, or gently breathed upon, and gradually lowered upon the cell, taking care, as with all liquids, that no bubbles are formed by the operation. The cover may be fixed by the aid of gold-size, japan, or any of the usual varnishes; care being taken, as before, that all the compound is removed from the parts to which the varnish is intended to adhere.—*Davies on Mounting, &c.*

NOTES AND QUERIES.

"Eye-stones."—For the last fifteen years I have had in my cabinet two small specimens of what are vulgarly called "Eye-stones." I am uncertain whether they are familiar objects to a naturalist, and should be happy to learn more about them. All the information I am able to give as to their history is, that my father obtained them, about fifty years since, in New York, and that they were found in the sand of the coast. They are about the size of half a cherry-stone, and, owing to their form—plano-convex—are used for clearing foreign substances from the eye. The eyelid being raised, the flat side is placed next to the eyeball, and the eyelid suffered to close; it is then moved on its course, performing the circuit of the eye, clearing all before it. For my juvenile amusement they were placed in a shallow vessel containing a small quantity of vinegar. After a few moments, small bubbles appeared on their surface, and they suddenly moved about, generally across the vessel. Upon examination they appear to be shells, but yet have no aperture; so the question of their inhabitants is curious. The action of the vinegar on the lime of the shells no doubt causes effervescence, and therefore movements similar to camphor on water.—*Theodore Charles Izod, Upper Clapton.*

Cladodus mirabilis.—Among the many obscure problems respecting coal-measure faunæ which now wait for and are rapidly receiving solution, there is one having relation to the tooth known as Cladodus. The fishes of the Coal period were of two kinds,—Selachians and Ganoids, the former being, with the exception of their teeth and spines, cartilaginous; the latter being characterized by operculæ and a greater development of osseous structure; but none of the coal-measure fishes were true teleosts, or bony fishes having endo-skeletons of bone resembling the salmon, herring, &c., of the present day. Cladodus teeth evidently belong to the Selachians, or cartilaginous fishes; and hence they are always found scattered and unattached to the original matrix. The teeth known as Cladodus have been referred to two different coal-measure Selachians, viz. Gyracanthus and Ctenacanthus, but to which of these two they belong is yet included in the long array of unsolved problems which await the investigation of palæontologists. I am disposed for many reasons to think that the balance of evidence is in favour of Ctenacanthus; my chief reasons for holding the opinion being, that they are not unfrequently found associated with remains of Ctenacanthus, and that, in our Northumberland coal-measures at least, they and the spines of Ctenacanthus are rare: whereas the spines of Gyracanthus are abundant; and as the teeth consist of material equally as imperishable as the spines, and were certainly more numerous than the spines in the living animal, it is improbable that the spines should be found in abundance, and the teeth very rarely be discovered.—*T. P. Barkas, F.G.S.*

Misprints.—Will you be good enough to correct a slight and very pardonable misprint in my note on "Miltwast," in the December number. It is, however, a misprint which causes my quotation to read nonsensically. Instead of "greenes comming or proceeding from the rate or spleene," it should be "greeues" (griefs). Your printers have also made a little mistake in Mrs. Watney's brief gossip about bees; in fact, it is not the first time they have made the mistake of printing "W. Holland" when that lady writes—*R. Holland.*

Formation of the Hen's Egg.—Are naturalists agreed as to the way in which the egg is formed in domesticated poultry? It is asserted that the egg is formed soft within the bird, being *blown out* in a semifluid state, and hardened by exposure to the air. This to a certain extent must be true. Last year, however, we killed a hen with a fully-formed egg *inside* her; the shell, though thin, being quite firm and fit for the table. Weight just under two ounces. This particular egg was never "blown out." Any one may become more or less familiar with the internal processes of a hen. The germs or ovaries may be seen as small as a pea, and their further progress traced in a rudimentary state. I have seen brought on table, from one hen, a succession of five or six at once, graduating in size from a filbert up to a round ball an inch and three-quarters in diameter, without perceiving in them any trace of the external covering, that hard calcareous matter which we call shell. It would appear that this coating is the last process previous to intended ejection, it may be almost a momentary application. In considering the process, we have certain necessities to deal with, which must have been, so to speak, considered by a provident Creator: 1st. The convenience to the bird of keeping the egg flexible while in process of growth. 2nd. The hindrance a *fixed* coating would be to the fertilizing influence of the male bird. 3rd. The certainty that the supply of matter which forms the shelly deposit is a special desideratum to the bird itself; and the fact that where suitable food is wanting, the shell is also wanting in consistency, would seem to show that the shell is a separate and local application. 4th. A certain mottled, uneven, curdling look, often found at one end of an egg, like ill-smoothed mortar, which appears as if it were caused by a sort of unsettled ooze, left at the final closing up of the egg. Can anatomists show if the *mitre*, which is well supplied with glands, has any province to perform in connection with this process?—*A. Hall.*

Vulcanite Cells.—"R. H. M." (S.-G., Dec., page 282) inquires for practical information as to experience with Vulcanite Cells. Mine are Pumphrey's. I have tried them in two ways, and succeeded well with both. I first tried gold size as a cement. The plan was as follows: Lay the cell on a flat surface, and paint over one side with moderately thick gold size, then place the cell in the exact centre of the slide: hold over the lamp till hot, then place on the upper surface of the cell another slip of glass, and put the whole into an American clothes-peg until the cement is quite set. The latter precaution is necessary because the cells are sometimes slightly bent, especially if they have been kept in a warm place. Baking in a cool oven facilitates the hardening of the gold size. The other plan was with marine glue, as follows: Cut some marine glue into small bits, and put into a bottle with about half its bulk of methylated chloroform. Cork the bottle loosely, and set in a warm place till the glue melts. The heat of boiling water is sufficient for this. Now cork closely and shake up till well mixed; keep the bottle warm for a little while, occasionally shaking up. When cold, part of the chloroform will be found at the bottom of the bottle, and must be poured off by breaking up the glue. Probably benzole would do as well as the chloroform and would be cheaper. When required for use, warm the bottle and take up a little of the glue on the end of a flat pointed splinter of wood; warm over the lamp and spread over one side of the cell, as in using the gold size. Place the cell, cement side downwards, on the slide; warm till the glue melts; put on the top another slip of glass, and put into a clip till cold. Lastly, scrape off all superfluous cement, and clean the slide in the usual manner. Of the two methods I prefer the one with marine glue, as being less likely to be acted on by balsam or preservative fluids, also because the slides are more easily cleaned, and the cells are almost immediately ready for use.—*J. H.*

Vulcanite Cells (p. 282).—In answer to "R. H. M.," regarding the best method of attaching Messrs. Pumphrey's Vulcanite Cells to the glass slide, I beg to say that I find they adhere well with marine glue, if *roughened* on a flat file on the side intended to be attached to the glass.—*P. E. B.*

Volition in Insects (*see* page 262).—We have no proof, undoubtedly, that insects possess a central brain. The evidence of dissection tends to show a series of brains rather; and yet I must still assert that there is a directing power somewhere; and can we localize it in any other part save the head? Take the instance of a caterpillar: if the parts of its body did not move in unison when it is crawling, we might see the head pointing forward, the claspers turning to the right, and the legs to the left. This does not occur. Look at the same creature again when eating: by smell or sight it is selecting a choice morsel of leaf. To aid the jaws in their manipulations, the body and legs are instantly obedient to the animal's will. I do not think the example of the fly given proves anything: motions of the muscles may take place after the guiding power has ceased to direct them. Nor, again, can the possession of volition, and its situation in any particular part, furnish any proof that insects have a nervous system conveying sensations analogous to the higher animals.—*J. R. S. C.*

In a Tank.—A short time since I put a small stone roach into a tank containing an eel seven or eight inches long, and a male *Dyticus marginalis*. The next morning I found the conferva, which had been growing very luxuriantly, all torn up for a space of some six or seven inches square, and rolled up into a case about five inches long and one inch in diameter, and open at the end nearest the bottom. Considerable force must have been used, as a tuft of Starwort, which had been there all the winter, was completely uprooted and rolled into the case. I left it in the water for about a fortnight, watching it closely all the time, but saw no use made of it, and all the inhabitants seem quite jolly together.—*J. G. Odell.*

Musical Cows.—That pigs are not the only animals who take a delight in musical sounds, may be proved by the following incident, of which I was a witness on more than one occasion. Opposite to our house was a large field, in which some twelve or thirteen cows were put during the summer months. One day a German band commenced to play in the road which divided the house from the field. The cows were quietly grazing at the other end of the field, but no sooner did they hear the music, than they at once advanced towards it, and stood with their heads over the wall attentively listening. This might have passed unnoticed; but, upon the musicians going away, the animals followed them as well as they could on the other side of the wall, and, when they could get no further, stood lowing piteously after their retreating forms. So excited did the cows become, that some of them ran round and round the field to try and get out, but finding no outlet, returned to the same corner where they had lost sight of the band; and it was some time before they seemed satisfied that the sweet sounds were really gone. It seems a strange coincidence that both the pigs and cows were charmed by music produced by a German band.—*L. E. Cafferata, Belmont Road, Liverpool.*

Moss Labels.—Can any reader of Science-Gossip inform me where Lists of Mosses for herbarium labels can be procured?—*M. H.*

Observations on Insect Life.—Several years ago, while on the "look-out" of one of our large elevators, I noticed a plump spider fall upon the metal roof beneath me, and a wasp darting after it, immediately secured it in a sort of basket formed by its legs, and then flew off with its prize. The question now was, what use has the wasp for the spider? The next season following gave me an opportunity of solving it. Noticing several wasps about some dingy windows in an area, I concluded to watch them, and soon had the satisfaction of seeing a few depart with their game. I traced their destination, and found it to be a number of clay structures under the eaves of a neighbouring dwelling. These formations had numerous perforations, about which the wasps busied themselves. Some time after they had abandoned the neighbourhood, I gained admittance to the house and removed several of these adobe nests. I opened one of them, and found a cell containing an egg or larvæ; the cell beside it was filled with spiders in a torpid state, both great and small, packed closely, with their front legs turned over their backs. The same order of arrangement was observed in the balance of the nest. I came to the conclusion that the spiders were placed there to keep a necessary temperature for the larvæ. I was not satisfied, however, and began a search among various authors, until Darwin, in his "Researches," set me right, by describing "certain wasp-like insects which construct in the corners of verandahs, clay cells for their larvæ. These cells they stuff full of half-dead spiders and caterpillars, which they seem wonderfully to know how to sting to that degree as to leave them paralyzed until their eggs are hatched, and the larvæ feed on this horrid mass of powerless, half-killed victims." I might go on and relate instances of the courage and ingenuity of the garden spider, but a fear that I am encroaching on your valuable space forbids it. I will close by giving another instance of the usefulness of observations of insect life. A Scotch mathematician, in measuring the angles of a bee cell, discovered an error in a table of logarithms "sufficiently great to have occasioned the loss of a ship at sea, whose captain happened to use a copy of the same logarithmic tables for calculating his longitude."—*H. W. Bleyer, Buffalo, N. Y.*

Curious Wood. — To such a height did the fondness of the Romans for curious wood carry them at one period of their history, that their tables were more expensive than the jewels of their ladies.—*Sylva Florifera.*

North London Naturalists' Club.—We are requested to state that the notice, which recently appeared in *Nature*, as to the closing of the North London Naturalists' Club, is entirely untrue. The Club continues its meetings on the fourth Thursday in the month, at Myddelton Hall, Islington.

Lime Deposit in Boilers (p. 281).—This well-known evil consists of calcium carbonate (carbonate of lime): The formation of such a crust may be checked, if not avoided, by adding a small quantity of sal-ammoniac to the water, soluble calcium chloride, and volatile ammonium, carbonate being formed. See Roscoe's "Elementary Chemistry," p. 176.—*G. H. H.*

Vulcanite Cells (page 282).—If "R. H. M." will rub the part of the cell to be attached to the slide on a file or a piece of sandstone to take off the glossy surface, I think he will succeed in fixing them with marine glue. The same course should also be taken with the top of cell, to make the cement which holds the cover-glass firmly adhere.—*E. G., Matlock.*

The Fungus Theory.—"Mr. Erasmus Wilson watches with amazed curiosity the progress of the fungus theory. It began, he says, with the dermophytes and nosophytes of Gruby; he disbelieved it; and disbelieves it still, although it has since intruded itself into almost every known disease of the body; at first there was a struggle for the distinction of genera and species. Every philosopher had his pet fungus. There was the fungus of Schönlein and the fungus of Audouin. A new order of knighthood seemed to have been created throughout Christendom, and every knight in Europe proclaimed his own particular fungus as the loveliest fungus of them all. Then a new school of philosophers declared that the difference amongst the various fungi was only a difference of their habitat; and that the same fungus transplanted to different beds exhibited those differences which unobservant, or too acutely observant, philosophers mistook for other species. Then, when the outside man was exhausted, the inside man came in with its discoveries. There were fungi for aphthæ, fungi for diphtheria, fungi for cholera; and, last and not least, we have fungi for internal cysts, fungi for syphilis, and fungi for gonorrhœa. This last absurdity completes the measure. 'Fungi,' says Mr. Wilson, 'are the morbid development of the natural components of the cell-structure of the economy; and just as pus is the product of the nuclei of the cell-tissue, just as mucus is equally a product of the normal constituents of the cells of the epithelium, and, being produced, enjoys the property of proliferation and growth; so these presumed and omnipresent fungi are the gatherers up of waste and exhausted organic matter, and are ready to be found wherever waste and exhaustion of organization prevail. Twenty years ago we taught the nature and relations of fungous life to all who chose to give heed; twenty years have passed away, and modern science has not come up to the standard which we then established.'"—*British Medical Journal, April* 4, 1868.

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them. We do not undertake to return rejected manuscripts unless sufficient stamps are enclosed to cover the return postage. Neither can we promise to refer to or return any manuscript after one month from the date of its receipt. All microscopical drawings intended for publication should have annexed thereto the powers employed, or the extent of enlargement, indicated in diameters (thus: × 320 diameters). Communications intended for publication should be written on one side of the paper only, and all scientific names, and names of places and individuals, should be as legible as possible. Wherever scientific names or technicalities are employed, it is hoped that the common names will accompany them. Lists or tables are inadmissible under any circumstances. Those of the popular names of British plants and animals are retained and registered for publication when sufficiently complete for that purpose, in whatever form may then be decided upon. Address, No. 192, Piccadilly, London, W.

H. D., H. M., J. S., Jun.—We do not pretend to name more than two specimens at a time from the same individual. In two instances to send six, and the other ten specimens, is too unreasonable to cause any hesitation in putting the rule in force.

W. H. S.—It was distinctly stated that no discussion of the question "Do insects feel pain?" would be permitted to extend beyond the December number.

J. S., Jun.—No. 1 is *Crisia denticulata*. No. 7 a sea-weed, *Corallina officinalis*. No. 10 a sea-weed in bad state.

E. M. H.—On palm is *Graphiola phœnicis*. Only by picking off and destroying the leaves affected. Will you send us further specimens, with locality?

W. C. P.—It is the "Spindle-tree," *Euonymus europæus*.

J. M.—You will not induce reptiles to eat during winter. All you can do is to let them alone, giving them the opportunity of burying themselves from the frost, under leaves, moss, &c.

A. L.—We cannot answer your question this month. If any information is obtainable, it shall be given in a future number.

A. R.—We cannot suppose that the constantly repeated notice that exchanges must be written out fairly and legibly is not read; our only conclusion must be that it is disregarded. Of course we can only resort to the penalty,—that is, non-insertion. We cannot write out such notices afresh, adding address, and giving the generic names in full. If such notices are to be inserted gratuitously, surely it cannot be too much to require that they should be written as they are to be printed.

G. E. Q.—The Eel-pout is *Lota vulgaris*.

Constant Subscribers will know that we have always insisted upon name and address being furnished, so that no attention will be paid to their communications.

A. C.—The Diatoms are, 1. *Coscinodiscus radiatus*; 2. *Pinnularia nobilis*. 3. *Campylodiscus cribrosus*. 4. *Endictya oceanica=Melosira cribrosus*, Sm. 5. *Aulacodiscus margaritaceus*. 6. *Coscinodiscus perforatus*.

Italian Bees.—"A. L." wishes to know where, and at what price he can purchase a Queen.

J. J. Exon wants to know where he can obtain Professor Goodsir's tube for studying infusoria.

S. S. desires to know the most approved method of hatching chickens by artificial means.

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Dicranella fallax, *Hookeria læte-virens*, and other mosses, for *Tayloria serrata*, *Timmia megapolitana*, and others.—Miss Jelly, Albion-street, New Brighton, Cheshire.

Fronds of Ferns showing fructification, unmounted, for objects of interest unmounted.—H. D., Claremont House, Waterloo, Liverpool.

Hair of Ermine, Musquash, Chinchilla, Skunk, Beaver, Jackall, Platypas, Minx, Fox, Otter, and Lion, for other material.—E. J. Wilson, 82, Southampton-road, Hampstead, N.W.

British and Foreign Land and Freshwater Shells in exchange for foreign ditto.—G. S. T., 58, Villa-road, Handsworth, Staffordshire.

Chalk Fossils for Silurian fossils.—John Parker, St. Faith's-lane, Norwich.

Synapta inhærens, in spirit, for good slides of the *Echinodermata*, diatoms, or other interesting objects.—William Swanston, 7, College-square East, Belfast.

Diatomaceous Deposit from North Wales.—Send stamp and object of interest.—W. H. Gomm, Waltham Abbey, Essex.

Winged Seeds.—*Lophospermum scandens* and others for other objects (seeds excepted).—C. D., 187, Oxford-street, Mile End, E.

For Membrane of Wing and Hair of English Bats, send stamped envelope to Isaac Wheatley, Malling-street, Lewes. Any microscopic object acceptable.

Birds' Eggs for fertile eggs of *Lepidoptera* or pupæ.—Thomas H. Hedworth, Dunston, Gateshead.

Silurian Fossils for those of the Devonian, Mountain limestone, Permian, Gault, or Green-sand formations.—E. Hendon, 1, Cleobury-terrace, Berners-street, Lozells, Birmingham.

BOOKS RECEIVED.

"The Monthly Microscopical Journal." December, 1870.

"The Animal World," for December, 1870.

"Land and Water." Nos. 254, 255, 256, 257.

"The Gardener's Magazine," for December, 1870.

"Boston Journal of Chemistry." December, 1870.

"Journal of Applied Science." November, December, 1870.

"Proceedings at the Annual Meeting of the Natural History Society of Montreal." 1870.

"The American Naturalist." December, 1870.

Communications Received.—C. J. W. R.—E. C. J.—H. C. L.—H. D.—C. H. W.—J. S., Jun—H. D.—H. B.—T. P. B.—A. H.—G. S. T.—A. J. M. A.—J. R. S. C.—W. H. S.—E. W.—J. J. E.—S. S.—J. P. G.—J. P.—G. E. Q.—J. E. T.—H. E. W.—E. G.—H. M.—J. C.—R. H.—T. W. W.—H. B.—T. C. I.—S. A. H.—W. S.—W. H. G.—W. J.—A. E.—T. H. H.—J. H—I W.—G. R.—C. D.—M. H.—G. H. H.—P. E. B.—C. W. B.—W. B.—E. F. E.—J. McL.—A. L.—A. C.—J. M.—W. C. P.—E. H.—E. M. H.

THE STORY OF A PIECE OF ROCK-SALT.

By J. E. TAYLOR, F.G.S., Etc.

IN many respects I differ from my geological associates, although my story, like theirs, will help to fill up the great lapse of time demanded by the antiquity of the globe. My origin was perfectly natural, and not of that semi-miraculous nature which some people have imagined. But truth is stranger than fiction, as my own case well exemplifies.

As a mineral I may lay claim to be almost as well known as my neighbours the pieces of coal and chalk. Geologically speaking, I am not limited to any particular formation or epoch, although I am about to speak of my experiences of that period which has been called "saliferous," or "salt-bearing," on account of the larger quantities of rock-salt to be obtained from it. But in almost the same mineral form I am found in other deposits, from the Silurian up to the Tertiary. In England, however, it is in that formation known as the "New Red Sandstone," or "Trias," that I occur most considerably. In Cheshire my presence is indicated by natural brine-springs, by the disfigured surface of the earth near the salt-mines, and by the dark, thick clouds of smoke which stretch across the heavens.

But before I proceed to describe, as well as I am able, the agencies which were at work elaborating me into the natural condition in which I am now found, or to give you my faint recollections of the physical geography of the period, and the animals and plants which lived—let me borrow a few general remarks from books, as to the classification of those rocks to which I here belong. Their modern name of "Trias" is derived from the tri-partite division into which they are separable. These go by the name of "Bunter," "Muschelkalk" (a German name for "shelly limestone"), and the "Keuper" beds. The former prevail largely in Lancashire, Cheshire, Shropshire, Warwickshire, &c., and are noted for their deep red colour, as well as for their thick beds of hardened gravels, or conglomerates of liver-coloured quartz. These indicate rough action in the seas where they were deposited, and the much-worn, rounded pebbles tell an equally plain story of the wear-and-tear to which they have been subjected since they existed as angular fragments of rocks. But throughout the whole of this series, you look almost in vain for any fossils. The coarse conditions under which the beds were formed were antagonistic to the preservation of any organic remains.

Towards the conclusion of this period, in Germany there existed a tolerably deep sea. The waters were pure and free from mechanical sediment; and here the corals and encrinites found all the fitting circumstances for their luxuriant growth and procreation. The sea-bottom was alive with the latter; one particular form, whose elegance has given to it the name of the "Lily encrinite," being peculiar to this particular member of the rock series. The coral reefs increased in the shallower places, whilst amid all these swam great fishes, whose teeth proclaimed their *reptilian* affinities, or still huger marine reptiles. Some of the latter had their teeth especially formed for crushing the shell-fish on which they fed, and which swarmed along the sea-bottom in countless thousands. Among these you may detect forms which belong to the Palæozoic as well as to the Mesozoic epoch—forms which geologists not long ago imagined were limited entirely and separately to one or the other of these two great divisions of time.

It is true the bed containing this admixture of Old World forms is slightly *younger* than those I am more particularly dwelling upon. But I could not forbear drawing the attention of my readers to this

striking fact—that the so-called "breaks" in the continuity of organic remains are fast disappearing before a more general geological investigation. The Hallstadt and St. Cassian beds, occupying the bases of the Austrian Alps, were formed along a sea-bottom during later Triassic times, where the fauna of the old and newer worlds met and commingled as on a common platform.

But it is to the third division of this interesting formation that I must specially allude. The middle member, the "Muschelkalk," is absent in England, so that the Keuper beds are seen in many places in midland and northern England reposing directly upon the Bunter. Where this occurs there is usually an "unconformability" between the two. That is to say, the dip of the two sets of strata is different. This means that the lower had been elevated before the upper had deen deposited, and therefore indicates a *break* in time between the two, and shows us plainly they were not continuously deposited.

The Keuper beds are my home. Here was I bred and born! From the top to the bottom, you have ample evidence of the physical circumstances under which they were deposited. Every layer indicates *shallow water;* in the ripple-marks, sun-cracks, rain-drop pittings, and feet-impressions of extinct reptiles. In Cheshire this series contains beds of rock-salt and gypsum, the whole attaining a thickness of fifteen hundred feet. The beds of rock-salt of which I am a humble portion, frequently attain the thickness of a hundred feet; and the area, in Cheshire and elsewhere, over which these extend, is calculated to be above one hundred and fifty miles across! This represents the magnitude of the natural salt-pan where I was formed. The beds are usually split up by a layer of clay or marl, and the rock-salt masses are usually tinted with a dirty red, caused by the slight admixture of iron. But not a trace of a fossil or any other organic remain do you ever get in the neighbourhood of the salt-bearing beds! Farther away, on what would be the flat shores of the sea where the salt was precipitated, you get evidences of fish and reptile life; as in Shropshire, Cheshire, Leicestershire, Warwickshire, &c. Mechanical impressions, such as ripple-marks and sun-cracks, are plentiful enough in the true salt-bearing series; but no *vital* evidences!

What does this general absence of fossils mean? It is not that they could not be preserved, for you have seen that other impressions are well enough and accurately enough laid by. It must mean that, in such limited areas at least, life from some cause or another was excluded. Such was actually the case. The shallow sea was so salt that no animal life could exist therein. You have similar conditions now in existence. The Dead Sea, extensive though it is, has no fauna. Its waters are thoroughly desolate, and know nothing of the pleasures of life. They are nothing but a vast menstruum, in which chemical solutions are so thick, that precipitations of the surcharges are constantly occurring. The Dead Sea level is nearly a quarter of a mile below that of the Mediterranean, and I am told that the neighbourhood is marked by Dead Sea beaches, indicating that the waters have been shrinking for generations bygone. The river Jordan continues to pour in his waters, which waters are more or less charged with mineral matter held in solution. The Jordan waters, however, are all evaporated from the Dead Sea surface, and, as the mineral matter cannot be disposed of in the same way, there is no alternative except precipitation. This is actually going on, and I am told that solid, cubic crystals of pure salt may be dredged from the Dead Sea bottom.

As well as I can remember, the physical conditions of the Keuper sea—at least over part of the Cheshire area—very much resembled those now in action in Palestine. The shells and thin flagstones of the Keuper elsewhere are frequently marked by the cubic pseudomorphs of salt, indicating that, far away from where the salt was most rapidly forming, the water was supersaturated. The absence of molluscan and fish life in the Dead Sea will enable you to understand the reason why the Cheshire salt-bearing beds contain no fossils, although they are so thickly crowded with evidences of ordinary atmospherical and mechanical action. When these beds were deposited, a Dead Sea existed in Cheshire and Worcestershire, and for so long a period that these thick, massive beds of rock-salt were formed along its bottom by the simple action of precipitation. We may regard these massive beds, therefore, as locally representing the excess of salt—just as iron-stone bands represent the excess of iron, and coal-seams the excess of carbon. The only difficulty which appears is the comparative purity of the rock-salt layers, and this the element of time sufficiently explains. It is very evident that the physical conditions remained unchanged for a long time, otherwise the rock-salt would have been intercalated with layers of other material. The stratum of shell or marl which separates the two main beds indicates a temporary suspension of these circumstances, after which the older conditions returned and lasted until an entire change had set in. These salt-masses are more or less rudely crystallized into columns, but I believe this was a subsequent process to the formation of the salt itself. Of course the lime-springs, from which so much of the salt of commerce is now extracted, have been formed simply by the surface water percolating the beds, and dissolving some of the solid salt in its course. At its exit, at a distance from the rock-salt masses, it is then charged with this culinary mineral. In many parts of Cheshire the surface is dotted with "meres," or fresh-water lakes, the haunts of rare birds and plants,

and the prettiest spots to be found in Old England. In many cases—perhaps in all—I believe these to have been formed by the slow setting of the overlying rock-masses over the hollows left by the dissolving of the rock-salt beneath in the way I have mentioned. I am told that in coal districts it is very common for the upper rocks to settle over the emptied seams, and to leave hollows on the surface.

I have simply given you my own idea, to the best of my recollection, of how rock-salt was formed. I have heard others repeat their own, and if you like will give it you, so that you may take them all for what they are worth; they have supposed a portion of the sea to be separated from the rest by a bar of sand, over which the ocean-waves every now and then toppled to supply it with water. In this cut-off sea, evaporation was going on, and a corresponding precipitation of salt; the toppling water of course supplying the place of that which had been evaporated. It is certain that rock-salt contains many of the same minerals as those usually met with in sea-water; such as iodine, bromine, magnesia, &c. So far, therefore, the argument is in favour of a truly marine origin of salt. And the occurrence of fish, reptiles, mollusca, &c., in beds of about the same age as those of central Cheshire, indicates the extension of a sea in which the water was fitted for animal life. However, in either of these opinions, the same principle lies at the bottom; viz., that rock-salt was precipitated from the surcharged saline sea, and that evaporation by solar heat was the immediate cause!

And now allow me to give you an idea of the animals which lived on the dry-land surface at the time when these important economical stores were being laid up. First were several species of a great *frog*-like reptile, or Batrachian. This type had come into existence during the Carboniferous epoch, although such primeval types seem first to have been purely marine in their habits. During the Triassic epoch, however, they certainly existed as land reptiles. The largest of these great frogs was about the size of a small ox; their teeth are of a very peculiar labyrinthine structure, and this character is very persistent. Singularly enough, the feet-impressions of these reptiles were found by geologists long before any of their remains had been met with. Owing to their remarkable likeness to an impression left by the human hand, the hypothetical animal leaving them was named *Cheirotherium*, or the "Beast with the hand." Another reptile, which combined lower with higher reptilian characters in a very extraordinary manner, was the *Rhynchosaurus*, or "Beaked Saurian." It had the features of a turtle, as regarded its horny bill, combined with the characters of a true lizard. It seems to have been web-footed, for in many parts of Shropshire and Cheshire the sandstone flags are marked as thickly with its webbed feet-marks, as is the margin of a clayey pond with those of ducks! This reptile was not nearly so large as the first I mentioned. The *Labyrinthodon*, as that is now called, seems to have haunted the shores of the Keuper Sea, for its foot-marks are found at many levels. These are generally seen traversing ripple-marks, as though the creature had passed over between tides.

In America, the same geological formation is impressed for more than a thousand feet in thickness, with the crowded foot-prints of extinct *birds*. Everywhere you have evidence of slow subsidence—a subsidence that was first compensated for by the amount of material deposited over the subsiding area. You may often trace for yourselves something of the habits of these singular and extinct British reptiles, so well have the soft sandstones done their duty in recording what they felt and saw! Here the Labyrinthodons slowly lifted their feet from the soft mud, from which there dropped portions before they were next set down. Or you may trace where they sluggishly squatted down, or where their huge bellies trailed over the soft ooze!

But by far the most interesting of the inhabitants of the dry land were small warm-blooded animals, belonging to the lowest division of the class—the *Marsupials*, or "pouched animals." These are now inhabitants of Australia, Tasmania, and North and South America—their isolated distribution proving their vast antiquity. In the times intervening since they first made their appearance, species belonging to this group have lived in various parts of the world. That to which I am alluding is very remarkable, as being probably the first warm-blooded animal which appeared on the earth! Its name is *Microlestes*, or the "little thief," so called on account of its insectivorous habits, as indicated by its teeth. This little creature—for it was not much bigger than a rat—preyed on the insects which then abounded in the pine-forests, or amid the thickets of fern and club-moss.

In a bed of later date, formed at the close of the Triassic epoch, and now termed the Rhætic formation, the strata are crowded with fossil insects. From this time forth the geologist never loses sight of the mammalia, and many deposits of later date contain a considerable number of species. In its fossil state, the *Microlestes* has been found both in Germany and England. However, time fails me to say what I have heard of the strange creatures which lived elsewhere, during the epoch when I was born. It is more than probable that the numerous gigantic birds, whose foot-prints are found in the Connecticut Valley, had *reptilian* affinities—just as, during the Oolitic period, the reptiles had *ornithic*, or bird-like affinities.

In South Africa there existed a peculiar group of reptiles termed *Dicynodonts*, from the peculiar walrus-like characters of their tusks or teeth. They

occur there in such abundance that the strata can be identified by their remains. The dry land everywhere was covered by a flora much resembling in its general characters that of the Carboniferous epoch. This is the last we see of the familiar coal forms, for others were already in existence, destined soon to replace them, and render them extinct. Thus much, therefore, for the dim recollections of a piece of Rock-salt!

ICE IN THE TROPICS.

(*With Notes on Methods of Refrigeration.*)

IN the hot season of 1846, when I first visited Benares, North-West Provinces, India, I was much surprised at seeing placed before me at dinner a Nesselrode pudding, and at finding that all our liquors were iced. I inquired how this was done, expecting to find that saltpetre and Glauber's salt, which I heard were often used for cooling purposes in India, had been employed. But judge of my astonishment when I was told that ice had been used, and that the said ice had been manufactured at Benares, where the thermometer seldom, if ever, falls so low as 42° Fahr.

I will presently give a short account of the manner in which it is obtained; but I will first gossip a little about the various methods of cooling beverages, &c., in common use, where ice cannot be obtained in India.

1st. Tatties, or screens made of khas-khas grass, are placed in the window-frames, and by water being thrown upon them the fierce hot winds create a great coolness inside them by forcing themselves through the interstices, having become cool through the rapid evaporation of the water, which process produces intense cold.

On the lee side are placed plates of fruit, bottles of water, wine, &c., which are well cooled in this manner. The "khas-khas" consists of the roots of a sort of grass with an aromatic odour, found growing in sandy places (*Andropogon veterina*).

2. But in many places khas-khas cannot be obtained, and I have then seen bottles of water, wine, beer, &c., placed in loose straw in open-work wicker baskets well sprinkled with water, attached by a rope to a high bough, and swung violently to and fro in the hot, still air, whereby a very considerable degree of coolness has been imparted. This, of course, was caused by the same rapid evaporation in a hot current of air.

3. Again, frames are constructed of grass or khas-khas, to swing backwards and forwards, with places made in either side for bottles, which were kept well watered.

4. But yet, again, another way. Water is placed in a porous jar or "soraiee"—such as the Gennèh jars of Egypt—wrapped round with a wet cloth and placed in a hot place. This rapidly becomes cool, as do the bottles which stood in it.

5. Next to ice the best thing is a mixture of saltpetre and Glauber's salt—I believe about ¼ of the latter to ¾ of the former. These are dissolved in water, and, whilst dissolving, the bottle to be cooled is shaken violently about in the liquid, whereby great cold, even to freezing ices, is produced; and for many years our ices were so prepared in their moulds for table use.

But, to return from this digression, I will relate how the ice is obtained at many up-country stations in the North-West Provinces of India; and as the railway is now bringing Wenham Lake ice, imported *viâ* the Presidency towns, into more general use, it may be worth placing on record as a thing becoming rapidly obsolete.

From my inquiries, there is every reason to believe that the great Akbar had his ice prepared in the same manner at Agra, and the natives now manufacture it as well as Europeans.

The residents at a station generally club together, raise a fund, and place it in the hands of some energetic member, who proceeds as follows:—

He builds an ice-house and lays out ice-fields. This ice-house consists of a pit, some fifteen feet in diameter and as many in depth, dug in as dry a place as can be selected, on a level spot not too exposed. This pit is lined with double planking, with chaff well rammed between the two sets of boards; whilst, to increase the non-conducting power of heat of the sides, a lining is generally put in, consisting of a thick rope of tightly-tied up straw or stalks, wound round and round interiorly.

Arrangements by pumping or dipping are also made for keeping the space clear of the water which accumulates at the bottom, owing to the melting of the ice.

Over this ice-well there is erected a round house with very thick walls, sometimes single and at others double, whilst over all is a very thick conical thatch. A small door completes the building.

Into this the ice is brought as collected in large baskets as fast as possible, and men are employed to beat it down, so as to consolidate it; and upon this ice, so stored, depends the luxury of cool beverages in the hot weather.

But now to its manufacture.

The level ground is laid out in broad walks, and these intersect one another at right angles, forming large beds. These beds are again subdivided into smaller ones, of, perhaps, 10 feet square. At the points of intersection are placed large earthen tubs filled with water, and by them are large heaps of small shallow saucers, of, perhaps, 5 or 6 inches in diameter and 1½ inch deep. The level of the beds is about 4 or 5 inches lower than that of the paths.

Hard by stands a large stack of straw, and many baskets, large and small, are ranged alongside.

This straw is spread lightly and loosely on all the beds; and upon it, as closely as possible, are placed the little saucers.

In the evening, when there is a fair promise of a clear, bright, still night, with whatever zephyr there may be from the north or north-east, men come and, with long ladles, dip out water from the tubs and pour a little into each of the saucers, of which there are sometimes 10,000 set up in a single night. Should all go well, and the thermometer fall as low as 44° Fahr., without fog or wind, a thin coating of ice may be expected on every pan. Should, however, clouds get up or wind, the little which may have been formed will rapidly melt.

We will, however, suppose that all goes well, when, long before daylight, there may be heard the beating of many small drums, called "Tàm-tàms," to summon a host of women and children from all the surrounding hamlets to gather in the harvest.

The water in the large tubs having been expended in filling the little pans, large open-work wicker baskets are placed on their tops, in which the ice has to drain and be weighed, ere it is deposited in the ice-pits.

The small baskets are spread everywhere along the paths. Each worker is provided with some tool for scratching out the ice from the pan, either a knife or a small sickle, or even a bit of iron hoop.

Men are appointed to superintend; and now commences a strange scene. Hundreds, nay thousands, are sometimes employed all at once, and every one is in a hurry. The clattering of the scrapers, the rushing hither and thither, and the constant chatter, are quite bewildering.

However, all work with a will, and in less than an hour the ice is all gathered and the empty little pans piled in heaps in the corner of each bed. Many small baskets have filled the large one, and, in the aggregate, perhaps 2,000 lb. of ice have been collected.

The thickness of a florin is considered to produce a very excellent crop, whilst it is often gathered when only half that thickness.

The cause of the formation of ice at the high temperature of 42° to 44° Fahr. is doubtless the rapid *evaporation* of the water which percolates through the earthen pans in some degree, there also being a current of air through the loose underlying straw, occasioned by the dryness of the atmosphere. Directly the air becomes moist with fog or otherwise, all formation of ice, as above noted, ceases.

These ice-fields often occupy several acres, so that it can easily be imagined what a number of people must be employed. Directly the work is finished, all assemble at a known spot, where stands a man with a sack of pice, or small copper money, two or three of which are given to each.

This ice is generally gathered about Christmas, although I have known good takes in January and February, and the pits are not opened for use till April or May, when the hot weather is setting in in earnest.

One share generally costs about £5, and for this the shareholder receives at the pit's mouth, by weight, eight pounds of dirty flake ice every other morning. The distribution takes place before daylight, *i.e.*, at what is held to be the earliest time of the twenty-four hours. The servant receives it and places it in a rough dry blanket, ties it up tightly in a bundle, and beats it well on the outside with a wooden mallet which he brings for this purpose, in order to drive out the water. He then places the bundle in a covered basket made of "sholah" (*Æschynomene Indica*) the pith of a plant often used for making hats, and a great non-conductor of heat. This basket is wadded within and without with cotton, and then covered with cloth. Arrived at his master's house, he again beats it and puts it in the ice-box. Here are placed the bottles of water, wine, beer, butter, &c., which it is wished to cool, and then, with a beating once or twice a day, this ice will last for at least two days, till the next supply comes in. On an average the supply holds out for four or four and a half months; so that the cost is about 2d. or 2½d. per pound. Of course the cost of production varies immensely. A series of bad nights after preparations have been made, or of inefficient ice-gatherings, will enhance it much; whilst four or five good nights will often fill the pits.

The great secret of keeping the ice is to allow no moisture, and to surround it with non-conductors of heat as much as possible; and it may, perhaps, not be out of place here to describe what appears to be the best form of ice-box which can be made up anywhere, and which may prove useful to colonists and others either unable to get ice-safes, or unwilling to go to the great expense of purchasing them. There are now many freezing-machines in use, and the ice made in them may be kept in a similar manner.

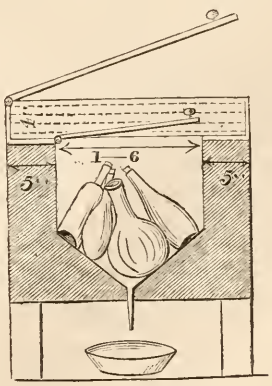


Fig. 15. Section of Ice-box.

Take an old box or packing-case 2 feet 6 inches square (or any other size), put a strong closely-fitting cover or lid on hinges; fix on legs, say 1 foot high; then of the tin which it was lined with make a tin box, 1 foot 6 inches square, pointed at the bottom, into which fix a thin pipe with a little cotton in it, so that the water may only fall a drop at a time. Imbed this tin box (zinc is better) in a packing of sawdust or bran and pounded charcoal, as shown in the shaded part, so that there shall be 5 inches around it well packed on every side. Put on a cover with a lid closely fitting, so that the packing shall not get into the cooling compartment.

Lastly, make a padded cushion, 3 inches thick, to fit well between the two covers, and you have a first-rate yet simple ice-box. The ice put in this may be in blocks, as is the Wenham Lake ice, or in blankets as above described, and I think the simplicity of the above plan will commend itself to every one. I have used it many years, and made many for others, and I trust the hints above noted may prove of general use.

C. Horne, late R.C.S.

THE ROBIN.

"THE little bird with the pious breast," as one of our poets designated the Robin, seems quite a winter subject to write on, so I send you a notice of my newest pet.

Six weeks ago I found, on going into my room one afternoon, a pretty Robin flying about; so, closing the window, I proceeded to catch it, and having caught it, wishing to keep it until my boy came home at night from school, I put it in the cage with my canary.

Madam Yellow-dues seemed much astonished at the appearance of her visitor, fluttered about him, and began to talk in bird language; but Bobby took little heed of her. After the lapse of half an hour, he suddenly brushed up, and began to pick a little raw meat which I had provided for him. He appeared so contented with his new quarters before night, that I determined to keep him; so I went out to purchase a cage, and began to fear that I should have to come back without one; for such an article was not to be had in the shops where such ought to be; but, most fortunately, I mentioned my difficulty in another quarter, and a cage was kindly spared to me.

Bobby was introduced to his new home at once, but the doors of both cages being left open, he had the liberty of choice given him. He preferred sleeping on his own perch, and ate a very good breakfast next morning; so I began to entertain hopes of keeping him, although every one said,—"He'll die." "He'll beat himself to death against the bars."

Then others said, "He'll never sing;" and one friend told me "It is *unlucky* to keep a Robin."

One evening, soon after the lamp was lighted, I heard a *low*, sweet song; it was very faint, and the notes ceased directly I spoke. Next evening the strain was repeated, and now Bobby opens his beak wide, and gives out the entire power of his voice in song. He sings in the daytime, especially if the weather be very rough out of doors.

Bertie says, "Bobby is pleased to think he is in comfortable quarters, when so many of his poor relatives are out in the snow;" but I am unable to decide whether Bobby is so unamiable and selfish as this would imply; or if it is the sound of the howling wind that excites his vocal accomplishments into action.

His chief time for performing is after the lamp has been lighted, when I am at dinner—a time when all respectable Bobbies ought to have their heads under their wings—and he looks out for sundry portions of the meat. I have discovered that he likes a chicken bone to pick, and fully approves of plum-pudding; but rejects a *drop* of sherry in his goblet of water, as he does a decoction of saffron; but he enjoys a tepid bath in a big saucer exceedingly, and shakes his head, and flaps his wings in a way that would justify the sedate members of the Robin family in placing him under greater restraint than I have, when he wants me to understand he would like a dip.

He scarcely looks at the canary; she was at first very attentive to him, following him from cage to cage; but she has now turned spiteful, and pecks at him. He is, I am glad to say, too much of a gentleman to beat her. He hops away.

She has laid five eggs, and quite expected Bobby to help in making a nest out of some wool she succeeded in drawing into her cage, but this he did not appear to know anything about.

I wish some one accustomed to birds would tell me if a caged Robin has ever been known to pair in the spring with a canary. A hybrid between the two birds would, I should fancy, exhibit strange plumage, and prove a valuable songster. If there is a chance of it, I would get a proper cage and nest-making materials, and let the canary set.

Helen E. Watney.

Beaumaris, North Wales.

Eel Pout.—It was stated in the last number of Science-Gossip that the Eel-Pout (*Lota vulgaris*) was confined to the north-east of England. I beg to state that it has been several times caught in the Penk, a tributary of the Trent, near Penkridge, in Staffordshire.—*W. A. S.*

THE HUMAN EYE.

THE publishers of a work just issued on "The Wonders of the Human Body,"* translated from the French, give the following reasons for doing so. "There is an increasing tendency in the present day to make common property of special knowledge. Even such information as formerly belonged to certain professions alone is, at least in its rudiments, becoming more generally diffused; and on the part even of those professions the tendency is recognized as within reasonable bounds deserving of encouragement. To take 'the human body' as an illustration, medical men find that the useful feature of their art is facilitated by the dissemination of information regarding its structure and functions. On the other hand, the public daily see more and more clearly that 'prevention is better than cure,' and that to prevent derangements of the wonderful machine, with the guidance of which each individual is entrusted, more acquaintance with its mechanism and laws of normal action is indispensable. Apart from its utility, a knowledge of anatomy and physiology is gradually becoming a necessary part of a liberal education. To meet these requirements the publishers now present this translation from the French of a book which, in the original, has attained to great popularity," &c.

Without attempting to institute comparisons between this book and others on the same subject which preceded it, we will content ourselves with an extract from the chapter on "The Human Eye."

"As regards the distance at which man can distinguish objects, he is less gifted than many other animals; but in every other respect his visual powers are at least equal to that of inferior beings. We know very little of the sensations produced in animals by colours; it seems probable that they have a relative perception of them to a certain extent, as the sight of red irritates the bull, for example; and we know that birds of prey from a great height in the air distinguish the colour as well as the form of a lark or quail hiding in the ploughed fields, although it so closely resembles that of the soil. But if we should suppose them endowed with sensitive faculties, useless within the limits of their instinct, could we find anything in animals more perfect than the organs to which man owes the prodigies of painting? We must, however, distinguish here between that which pertains to the visual apparatus and that which proceeds from the intellect. The eye perceives the tints which nature offers in almost infinite variety; the mind compares them, and recognizes the elementary colours of which they are composed; the eye reflects in turn the model, the palette, and the picture; the mind perceives the relation of shades, and combines them in such a manner, that by mingling or contrasting them such a result is produced as conforms to the first impression; but in order that an artist may judge whether red or blue predominates in a violet tint, in order to appreciate the shade, the retina must transmit it to the brain in its purity.

"At the manufactory of the Gobelins we see the wools used in the fabrication of the tapestries arranged according to their shades. The number of these shades exceeds 28,000, and yet when we compare two approximate shades we distinguish them with facility, and perceive the interval which separates them.

"The people who live in the country, seamen, and especially men living in a savage state, generally have sharper sight than the residents of cities. May not the habit of seeking to distinguish objects at a distance give the eyes a power which is not acquired when they always act within a limited horizon? Without assimilating exactly the effects of exercise on the eye to those which result from exercise of a muscle, we are justified in thinking that an almost incessant accommodation to great distances must influence the eye in that respect, and if, as is very probable, the accommodation takes place by the contraction of the muscular fibres, the explanation of the increased range of the eye from exercise is very simple; but facts are wanting which verify and measure this increase in individuals. There is no doubt, however, that men from whom the horizon is habitually distant distinguish certain objects at a point where they are confused to other persons, although within the reach of their vision.

"A ship appears on the horizon, a man unacquainted with the sea can hardly distinguish the sails of this white cloud springing from the waters; but a sailor will tell you that it is a brig, or a three-master, a war vessel or a merchant ship, and often he will even come at its tonnage, its lading, its nationality, and its name. The Arab and the European in the midst of the sands of Sahara see on the horizon an object, which to the European is only a black point without appreciable form; the Arab sees a camel distinctly, and declares that it is at such or such a distance, without ever being deceived.

"The inexperienced mountain traveller sees before him a chaos of slopes and abrupt walls, of elevations and windings, among which he can distinguish neither route nor practicable passage; but the mountaineer sees at once the accessible points, and the turns which he must take to reach the summit of the apparently impassable barrier. This proves not that the sailor, the mountaineer, and the Arab have sharper sight than the stranger to their country; but that they have learned to know the signification of such and such details of form, such a particularity of colour, and the like, which are for

* "Wonders of the Human Body," from the French of A. le Pileur, M.D. Illustrated by forty-five engravings by Léveillé. London: Blackie & Son.

them distinguishing marks, which seem to trace before their eyes the description which they give to their fellow-voyager of objects that are either confused or imperceptible to him. It is, therefore, to acquired notions, and skill in seeing objects, rather than to extent of vision, that they owe the faculty of distinguishing objects at great distances.

"We find also in all countries, and in all climates, men who have extraordinary power of vision. Wrangel speaks, in his 'Voyage to the Polar Seas,' of a Yakoute who related having seen a great star swallow little ones, and then vomit them up again. That man, says Wrangel, had seen the eclipses of the satellites of Jupiter. Humboldt tells, in his 'Cosmos,' of a tailor in Breslau, named Schön, who also had seen the satellites of Jupiter with the naked eye. No examples of a greater range of vision are known."—Pp. 179-181.

HUNTING FOR INSECTS' EGGS.

IT is not so very long since, when scarcely anybody, even amongst entomologists, thought of looking after the eggs of insects. Now and then it would happen that a butterfly or moth deposited these in the collecting-box or on the setting-board; and then, perhaps, they were taken care of, and the young progeny fed up; and perhaps not. And yet it might naturally have suggested itself to the inquiring mind of the collector, that by securing the eggs of the species desired, good specimens could be got for the cabinet, and an addition made to the individual's store of knowledge. However, an impetus has of late been given to larva-rearing, and in consequence of that egg-hunting has become a distinct branch of the various pursuits to which Lepidopterists especially have devoted themselves. There is, moreover, this advantage: eggs, unlike perfect insects or caterpillars, will neither fly away nor crawl off, but will give the collector ample time to secure them, if he goes at the right time, to the right place, and examines the right plant.

And now, too, we find microscopists putting in their claim for some of these objects, and I am sure entomologists will not complain; for who can tell how many of those that begin by studying these eggs only on account of their colours and shapes, may, after awhile, think it as well to know something about the objects which come out of them, and thus help forward insect-science?

In jotting down some remarks on the best way of going to work (and proceeding in the work) of finding eggs of butterflies and moths, I must disclaim almost, if not all, merit for originality, and acknowledge myself to be only "a gatherer and disposer of other men's matters." It must be so in natural history, and the sum total of the observations of the many, often recorded in haste, and in very varied styles, when digested and arranged, furnish a bulk of lore, which, rightly used, facilitates the labour of future students and investigators: the past enriches the present, and suggests encouragement for the future.

The transformations of the bulk, even of our British insects, are but little known in their details, the chief exception being the order Lepidoptera, which, being mostly favoured by collectors, has had the life-histories of its species traced out in many instances, the egg being the starting-point of the narrative. Very few of the eggs of individuals belonging to the other orders have been sought out, though as some of these closely simulate those of certain moths, an occasional collector brings home what he supposes to be a choice batch of eggs, from which he sees "in vision" the young caterpillars emerging and feeding well, and lo! the result is a party of unpleasant maggots, or else the six-legged larvæ of some beetle. This, however, would be of little consequence to the microscopic observer, whose interest centres in the shell, rather than the contents. The newly-hatched larva, though be it of what family it may, will be discovered also to have its points of interest; but its preservation, were this desired, would not be so easy as that of the egg.

No apparatus is required to be taken by the egg-hunter, unless, indeed, he were to take a beating-net or umbrella, in which to beat or shake the trees and plants; for there are some eggs so lightly attached to the substance on which they are laid that a jerk will bring them off; but this procedure need hardly be resorted to, not being very advantageous. And there is no day of the year when we might not go out with at least the probability of finding some eggs, though on a sharp winter's morning, when we are examining trunks of trees, boughs, and twigs, the fingers are apt to get so cold that the knife, if needed to cut the eggs off or out, can scarcely be handled. To an entomologist with a liking for the *dolce far niente*, in the glowing heats of summer, such a comparatively unenergetic pursuit may have its charms, the hands need not to be tasked, the eyes being called upon to take the leading part in the business. Patience certainly has to be exercised, both at the time of searching, and thereafter, for not all the eggs which look promising will by-and-by yield young caterpillars to the would-be breeder. Two causes, beyond the collector's control, may have led to this: the eggs may have been unfertile or barren, such being occasionally deposited by moths in a state of nature; or they may have been punctured by some small parasitic insect. That this occurs sometimes, there is no doubt; yet I believe the "ichneumonization" of eggs is less common than it has been conjectured to be. Eggs of insects are rarely, if ever, killed by heat, cold, or damp when left untouched. But of those which,

in the hands of the entomologist, fail to produce the young larvæ, many are destroyed because they have been placed in unfavourable circumstances, so that the germ is arrested in its progress. A word more upon this presently.

As a general rule, each mother butterfly or moth seeks out, for the reception of her eggs, either the appropriate food for the larvæ about to appear, or at least a spot from whence they can very easily reach this sustenance which is so indispensable. Hence, as the food of caterpillars is so very various in its kind, the places likely to yield eggs are varied —in fact, they may turn up almost anywhere when we are out in the open country.

Dr. Knaggs remarks on the more common positions, that they may be sought "on the surface and in the chinks of bark (frequently high upon the trunk and branches), on twigs, buds, leaves, flowers, and seeds of different trees and plants; sometimes on neighbouring objects, as palings, walls, rocks, stones, and clods; at others, among refuse animal and vegetable matters; now and then loosely scattered upon the ground, or even fixed to aquatic plants beneath the surface of the water."

The propensity some species have to drop their eggs at random amongst the herbage, either while they are crawling rapidly up and down bushes, or threading their way through the grass blades, or perhaps careering through the air a few feet above the ground, is one vexatious to the entomologist, favourable though it may be to the continuance of the particular species. As examples of this, I might give the Marbled White amongst butterflies, and the Oak Egger and the beautiful Yellow Underwing amongst moths. These deposit eggs in flight, and I believe a good number of the species belonging to the *Noctua* family are not at all particular as to where their eggs may chance to fall, the larvæ being often promiscuous feeders on low plants when young. Instinct, too, is sometimes at fault in the parent, and I have found the eggs of the Puss-moth more than once on lilac, which the larva rejects, and those of the Drinker, a grass-eating caterpillar, adhering to a bramble stem. Hence a beginner is sometimes puzzled to find young caterpillars reject what seems to be their right food. Moths, also, under the influence of some infatuation, lay eggs in places where the larvæ must starve. Gas-lamps and other lights are attractive to moths, and about these eggs are not unfrequently deposited. I have also found eggs laid on palings far from the plant appropriate to the larvæ of the species; and as they rarely travel far when very young (or if they do they come to grief), their career speedily ends—only born to die.

Some moths, why we cannot tell, seem to have a fancy for laying eggs on withered leaves, and I have noticed these sometimes curled up; thus entombing the newly-hatched larvæ.

More eggs will certainly be found on leaves during the spring and summer than on other substances, or at other seasons of the year. Those thus deposited are likely to hatch speedily, when as microscopic objects they cease to be beautiful, usually. The eggs which remain longest unhatched are laid in the autumn (a few even in winter), and the *locale* most frequently is the bark of trees or the twigs of bushes; sometimes the stems of low-growing perennial plants. In early spring many eggs will be detected on or close to the buds. Generally, when we are searching for the eggs of a species which deposits them on leaves, it is better to examine shrubs than trees, and those growing solitary rather than in clumps. Investigating some plants for eggs is very tedious work; as, for instance, small-leaved species, like those of the genus *Galium*. The eye, after a time, gets fatigued and dazzled. So frequently do we find that the moths select the under surface of leaves, that it has become a practice with some collectors not to examine the upper side at all. The Rev. J. Greene thinks that the genus *Dicranura* is almost the only exception to the rule. Some others do not, unfrequently, however, deposit eggs on the upper surface; as, for instance, certain of the Hawk-moths (*Populi*, *Ligustri*, &c.), and several of the Prominents. A reading-glass or hand-magnifier has been recommended as helpful to the egg-hunter, especially when he has to examine leaves under a deficiency of light, as in shady parts of woods. Impatient persons may not like to be told that one glance at a leaf or any object is rarely successful, except with those of marvellous quick perceptions, of whom (no doubt) there are some amongst both microscopists and entomologists; but it would savour of flattery to give that character to the majority. "More haste, less speed," holds good here; a careful examination of one twig will yield more results than a cursory glance at half a dozen. Many eggs are very much the colour of the leaves or substances on which they are to be found, and they are often appressed very flatly to the surface; as, for instance, those of the Brimstone Butterfly and the Herald Moth: on or alongside of the midrib is a favourite position; though some female moths show a manifest preference for the margins.

The searcher must always keep in mind that eggs are occasionally very imperfectly attached by gum, and an agitation given to their resting-place may send them off, when a hunt for them will be only a loss of time, if they descend into the grass or herbage; as bad, in fact, as "looking for a needle in a bottle of hay." The easiest eggs to find are those which are deposited by the parent insects in clusters, as those of the Cabbage and Tortoiseshell Butterflies; or amongst the Moths, those of such species as the Lackey, the Gold-tail, the Tigers, the Vapourers, and some of the Geometers. Mr. New-

man speaks highly of another mode of getting eggs, viz., by watching the females while thus engaged, and then "securing the product." I have not succeeded at this, but others may; it has disadvantages, for at such times insects endeavour to avoid observation, and dodging them about is tedious and disappointing work. It is at night, too, that most moths provide for the continuance of the species, when they may easily escape our notice, even if we are armed with the latest improved lantern. So, perhaps, the best way is, if we see a butterfly or moth we think thus intent, to capture it, and give it an opportunity to lay in confinement, which, however, some are very reluctant to do.

How should we keep eggs if we wish to obtain larvæ from them? We must have regard to the natural influences to which they would have been exposed, and imitate these as nearly as we can. As a rule, they should be kept cool, and if a leaf on which any are deposited dries up, it is better to remove them from it. Some advise laying them upon a pad of moss taken from an old wall; and this being placed in a flowerpot, the eggs may be kept slightly damp, which is conducive to their welfare. But if the contents of the eggs are not wished for, Ingpen advises that they should be punctured with a fine needle; then, says he, they will dry without shrivelling—sometimes. Boiling them has been found of no use; nor should I imagine that baking them would prove much more advantageous. Swammerdam, we are told, after he had emptied the shells, used to inflate them with air, or fill them with some resinous solution.

The hunter after the eggs of Lepidoptera may well be stimulated by recent discoveries in that direction. Think of Mr. Merrin detecting the eggs of one of our rarest Blues (*Lycæna Arion*) on the flowers of the wild thyme! These were highly curious in form, being spheroid, and marked with shallow cells, the divisions between the cells bearing spine-like processes; the texture and colour, we are informed, resembling white porcelain tinged with green. And through researches made in the winter months, it has now been demonstrated that the Hairstreak Butterflies place their eggs on the twigs or branches of their food-plants, to await the advent of the following spring, completely overturning the theories previously entertained about their history. So we may hope that, as egg-hunters increase, not only will new and beautiful objects be brought into view, but many misapprehensions be also removed which have obscured the annals of Entomology.

J. R. S. Clifford.

O happy Kingfisher! what care can he know,
By the clear, pleasant streams, as he skims to and fro,
Now lost in the shadow, now bright in the sheen
Of the hot summer sun, glancing scarlet and green.

Mary Howitt.

TITMICE.

Of all the small birds that ornament our forest, few are more hardy, more agile, or more ornamental than the family of Titmice.

The Long-tailed Titmouse, Blue Titmouse, and Great Titmouse, are all very beautiful little creatures; not only beautiful in plumage, but on the wing, creeping along a bough, or clinging to the bark of a tree, they are equally interesting, now flying with a jerk and wave-like motion from tree to tree, now at the root of a tree in quest of food, or suspended from the end of a branch; indeed, they are always doing something. They are curious little creatures, and although fond of the wood, they are in no way shy or timid at the approach of man.

The Long-tailed Titmouse (*Parus caudatus*) has a very long tail; it flies with a peculiar wave-like motion; when on the wing, the tail seems much longer than at other times: it is a very curious-looking little bird. In weight it scarcely outweighs the Wren; but it is when in the hand that you admire and wonder at the power of this little creature, so small it seems that you cannot hold it without hurting it; with loose and silk-like flossy feathers that cannot be handled without getting the feathers much out of place.

Although so fragile, it builds a very pretty nest, and brings up a number of young: they remain with us all the winter; their food is small insects and larvæ. The colour of this bird is a mixture of dusky olive, with dark and light brown; the bill is very small; indeed, a few disconcerted feathers will cover it. I tried to keep this bird in an aviary, but did not succeed. The Long-tailed Tit has not any song, only a plaintive twitter or call.

The Blue Titmouse (*Parus cæruleus*) is a merry, sprightly, active little fellow. It seems but little consequence to him whether in a cage, an aviary, or in the wood; if well cared for, he appears quite content. I should here mention, much of this depends upon the immediate care he gets. Soon after being taken, he must be fed frequently upon small mealworms; for a short time he should also have groats, suet, and hemp-seed. The Blue Tit requires a large close wire cage, as it mostly gets through the wires of an ordinary one. Much depends upon the first few hours' care; if neglected when taken, you cannot keep your Blue Tit alive. In an aviary the Blue Tit is quite at home, quite cheerful; and in a few days will begin to twitter: after a few days you may dispense with live food altogether, but as a substitute you should give a little sop bread and milk, and occasionally the Woodlark's meat. The colours of this lively little creature are very striking; the top of the head, or crest, and round the neck a beautiful blue, the sides of the head white, with a black line from the base of the bill to beyond

the eye; the tail and long or flight-feathers of the wing blue, the breast and under-part a dingy yellow; bill and legs of a pale blue. The Blue Tit has a sprightly note, but cannot be considered a songster.

The Cole Tit (*Parus ater*) is about the size of the Blue Tit, but has not such a beautiful plumage; it has a black cap; the general tone of the birds is an olive-brown, with a few white spots upon the ends of some few feathers; it has a sharp black beak, legs and claws exceedingly strong. If this bird is put in a cage with the Blue Tit, a battle ensues, in which the latter gets beaten, and if it succeeds in getting the Blue Tit in its claws, as is often the case, it will pluck the feathers out most unmercifully. The Cole Tit should be fed the same as the Blue Tit, but they are not so cheerful as that bird, nor so easily kept alive.

The Great Titmouse (*Parus major*) is a bold-looking bird, and very pugnacious. It is not safe to place him in a cage with other birds; he mostly kills any bird about his own size. I have seen the Great Tit seize a robin in its claws, and in a few seconds pick the poor creature's brains out. How different to the little Blue Tit, that rarely quarrels with any bird. Yet for all its cruel propensities, how pleasant to find them in small parties acrobating in our suburban gardens round London, as it frequently does in hard weather, chattering merrily. This bird has a peculiar and amusing method in feeding upon hemp-seed, making a quick tap, tap, tap, much like an undertaker hammers, until a hole is made, from which it eats the seed, casting away the shell apparently unbroken. It will feed upon German paste, as prepared for a woodlark, and dispose of mealworms most greedily. The Great Tit has a beautiful black cap, back and wings of a greyish green, the sides of the head, breast, and underpart of a dusky yellow; it has great strength in the feet and bill, and if handled darts upon the fingers and bites severely. The Great Tit has a sprightly wild song, which it mostly utters as soon as it alights. The Blue Tit, Cole Tit, and Great Tit, all tap with their bill when feeding upon hemp-seed, after the manner of the Woodpecker.

CHAS. J. W. RUDD.

UNDER A STONE.

THERE is some consolation for those who make the microscope their hobby, that they are very much independent of times and seasons; come snow, come blow, there is still occupation within doors in spite of wind and weather. The angler may be disconsolate, the botanist devoured by ennui, the entomologist a victim to despair; but with the microscope poor human nature is consoled for the loss of out-door pleasures. Alas, poor human nature! How often the weather comes in for blame when some trip to the woods has been postponed indefinitely, because of the rain—

> "When it clatters along the roofs,
> Like the tramp of hoofs!
> When it gushes and struggles out
> From the throat of the overflowing spout!
> Across the window pane
> It pours and pours;
> And swift and wide,
> With a muddy tide,
> Like a river down the gutter roars
> The rain, unwelcome rain."

This however may be bearable, for the morrow may be bright, or, at least, there is hope of a finer day within a week; but the summer grumbler is happy compared with a naturalist "snowed up." What a gush of unpleasurable sensations tingles down to the tips of one's fingers at the thought of a month's frost and snow. Suppose that we had been planning sundry explorations during the Christmas holidays, in the fond hope that a "green Christmas" would again, as it had done before, favour the out-door collector of Nature's unconsidered trifles. And then suppose such a Christmas as this last one to throw a snow blanket over the earth and our projects. Grumble, should we? Well, perhaps we might, and not much to our credit either. History has narrated to us of prisoners in their cells finding contentment and companionship in a mouse, a spider, or a flower. Doubtless he who can accept all such events with resignation, with no disposition to grumble, but every disposition to turn the most untoward circumstances to advantage, is the happier man.

Those who are blessed with vigorous health do not realize the pleasure which an invalid finds in a little plot of garden ground; to him it is all the outside world. In it he will discover treasures scarce dreamt of by those who have the world before them wherein to roam. A little garden to an invalid, and what he saw and observed in it during a whole year! What a subject for a book, and how many interesting chapters might such an invalid contribute by the help of a microscope. Some months ago, during conversation with a friend on "subjects to write about," he suggested, "insects found under a stone." At the time this was acknowledged a capital idea, and—not the first time such a thing has happened—no more was thought about it.

Recently confined to the limits of a garden, and at no very cheerful season,—just before the snow set in—this incident was revived by the sight of a large stone, and immediately the thought "I wonder what is under it?" came like a flash across the mind. The answer to this question is just what I am seated to write, and if there was not much found under the stone at such a season the observer is not to blame, and the stone is not to blame, and certainly not the insects that were absent. They were wise, for it was very, very cold.

Turning over the stone, the first and most active creature under it was a spider, who speedily made up his mind to escape if possible. It is a curious fact that, in the majority of cases, if you will turn over a good-sized stone, the first, and often the only living creature seen there will be a spider. If there is any desire on the part of the observer to capture it, the second fact discovered will be that spiders are very active, and rather cunning. Some people are under the impression that if we have a dozen species of spiders in Britain, we have no more. There is the House Spider, and the Garden Spider, and the Money-spinner, and the Water Spider, and —perhaps they know no more. But the fact is, that some hundreds of spiders are described in Mr. Blackwall's splendid book, and it is very probable that it does not contain more than half the different species which inhabit our islands. This little spider is not a quarter of an inch long, but it



Fig. 16. *Walckenaera cristata.*

has a very long name—it is *Walckenaera cristata.* The figure is magnified (fig. 16), and gives some idea of the appearance of this active little gentleman, for fortunately it was of the male sex. Some people never look upon a spider except with feelings of disgust. Ladies of delicate sensibilities have been known to faint at the sight of one. Perhaps this might be accounted for if Ovid's story were true that a very clever lady was once transformed into a spider. Arachne, excellently skilled at the loom, had the presumption to challenge Minerva, and, being defeated, hung herself in despair; the goddess, moved by pity, transformed her into a spider.

> "Her usual features vanished from their place,
> Her body lessened all, but most her face:
> Her slender fingers, hanging on each side,
> With many joints, the use of legs supplied;
> A spider's bag the rest, from which she gives
> A thread, and still by constant weaving lives."

In memory of this unfortunate lady the whole order of spiders are named *Arachnidæ*, a graceful tribute to skill and industry. The eight eyes and absence of vocal powers are not accounted for in this story; the transformation must have been a wonderful one.

The great variety in the arrangement of these eight eyes in the different genera of spiders is worthy of observation. In *Walckenaera* the front part of the cephalo-thorax is usually elevated into a kind of hump, and four eyes are placed about it in the form of a trapezoid or small square (fig. 17 *a*); then on either side is another pair, placed one above another, and close together. The eyes of each pair placed at the side, in the little specimen found under a stone, are the largest. The general colour is brownish-black, the legs reddish-brown, and the abdomen is hairy. It would be easy enough to occupy a column in describing all the parts of this interesting little creature, but, having no such intention, I shall at once confine myself to those organs which, in their complex development, characterize the male, and on which microscopists are invited to employ their instruments if they desire a fresh field for observation.

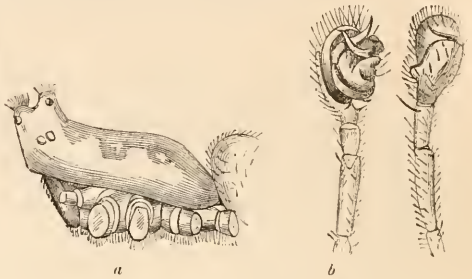


Fig. 17. *a*, Profile of cephalo-thorax of *Walckenaera*, with eyes; *b*, front view of palpus; *c*, back view of palpus.

Notice particularly in this, and all male spiders, a pair of clubbed organs, something like antennæ, which project in front, and are often curved downwards. These are the *palpi.* Probably their pur-



Fig. 18. Palpus of *Walckenaera* displayed.

pose is allied to that of the highly-developed antennæ in most of the Anopleura, and some of the Entomostraca. As seen in the living animal (we are forbidden to call spiders insects), the palpi are more or less clubs (fig. 17), but when prepared and flattened out, the parts are separated, and though no longer resembling in form what they were in their natural situation, and condition, they can be more readily studied, and their very complex cha-

racter observed. In order that this structure may be compared in different genera, I have given figures of three. Fig. 18 is taken from *Walckenaera cristata;* fig. 19 is from a larger spider closely allied, called *Linyphia confusa;* and fig. 20 from *Ciniflo similis*, both taken at other times, skulking in a similar manner under stones. The



Fig. 19. Palpus of *Linyphia confusa*.

figures are drawn from specimens mounted in balsam, flattened out so as to exhibit structure by



Fig. 20. Palpus of *Ciniflo similis*.

uncoiling the upper portion, which naturally is coiled up compactly like a watch-spring. The projecting hooks and processes are very curious. Industrious microscopist, with little to do, and wanting occupation, here is good work for you! Study a spider well, and then write a monograph, as has already been done for the House-fly.

With an anecdote of spiders as teachers, taken from the *Quarterly Review* of a quarter of a century ago, I shall leave them to the better consideration of my readers. Quatremer Disjonval, a Frenchman by birth, was an adjutant-general in Holland, and took an active part on the side of the Dutch patriots when they revolted against the Stadtholder. On the arrival of the Prussian army under the command of the Duke of Brunswick, he was immediately taken, tried, and having been condemned to twenty-five years' imprisonment, was incarcerated in a dungeon at Utrecht, where he remained eight years. During this long confinement, by many curious observations upon his sole companions, spiders, he discovered that they were in the highest degree sensitive of approaching changes in the atmosphere, and that their retirement and reappearance, their weaving and general habits were intimately connected with the changes of the weather. In the reading of these living barometers he became wonderfully accurate, so much so, that he could prognosticate the approach of severe weather from ten to fourteen days before it set in, which is proven by the following remarkable fact which led to his release. When the troops of the French republic overran Holland in the winter of the year 1794, and kept pushing forward over the ice, a sudden and unexpected thaw in the early part of December threatened the destruction of the whole army unless it was instantly withdrawn. The French generals were thinking seriously of accepting a sum offered by the Dutch, and withdrawing their troops, when Disjonval, who hoped that the success of the republican army might lead to his release, used every exertion, and at length succeeded in getting a letter conveyed to the French general in 1795, in which he pledged himself, from the peculiar actions of the spiders, of whose movements he was enabled to judge with perfect accuracy, that within fourteen days there would commence a most severe frost, which would make the French masters of all the rivers, and afford them sufficient time to complete and make sure of the conquest they had commenced before it should be followed by a thaw. The commander of the French forces believed his prognostication and persevered. The cold weather which Disjonval had predicted made its appearance in twelve days, and with such intensity that the ice over the rivers and canals became capable of bearing the heaviest artillery. On the 28th of January, 1795, the French army entered Utrecht in triumph; and Quatremer Disjonval, who had watched the habits of his spiders with so much intelligence and success, was as a reward for his ingenuity, released from prison.

Another creature coiled up under the stone,

motionless, was *Iulus terrestris* — a worm-like fellow, little more than an inch in length, almost as round as a piece of wire, covered with plated armour, like a coat of mail. There he lay coiled round into a disc the size of a waistcoat-button, with his numerous short legs visible like a fringe throughout his entire length. It required some little effort to get him uncoiled, and extended at full length. I must confess that there was not much about him that was attractive, but under the circumstances any living thing had its interest. And even an *Iulus* is not without interest of its own, for the appearance of this coiled-up creature, seemingly deficient of life or energy, was sufficient to

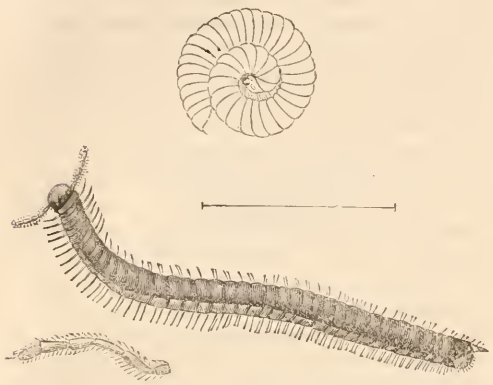


Fig. 21. *Iulus terrestris.*

remind one that, once upon a time, a very clever and industrious American doctor (Dr. Leidy) dissected I cannot tell how many scores of these creatures, and explored the mysteries of their internal economy. The result was the publication of a memoir, in quarto, with several plates, entitled "A Flora and Fauna within Living Animals." Dr. Leidy found several species of minute parasitic plants, of a fungoid or algal character, and some parasitic animals of low organization, living and flourishing within the large intestine of *Iulus marginatus*. Probably these, or similar organisms, are to be found in *Iulus terrestris*. This very individual from under a stone may have a flora and fauna within its intestinal canal.

When the *Iulus* does move, and does put all his long line of short legs on each side of his body into motion, what an exhibition he makes of himself! It seems useless to think of counting them. In some country places he is called "forty-foot," but that is quite a misnomer, for he seems certainly to have double that number on one side. This is one of the Myriapods not generally classed with insects, although some recent authors have ventured to associate them therewith. Dr. Packard has done so: he may be right, we do not care to judge. This is what he says about *Iulus*. It is long, cylindrical, hard, with numerous feet, short and weak, attached to the under surface of the body, nearly in the middle of the abdomen. The antennæ are short and filiform. They crawl rather slowly, and at rest curve the body into a ring. They live on vegetable substances, or eat dead earthworms or snails. In the spring the female deposits her eggs in masses of sixty or seventy, in a hole excavated for the purpose under the ground: after three weeks or more the young make their appearance. A great deal more he says about them, but as my space is nearly filled up, I must take another peep under the stone, and have done.

There they go! one, two, three,—at least a dozen, some running hither and thither, others rolled up like a ball. In school-boy days we called them "old sows," in Scotland I think they are called "slaters," but the gardener knows them as woodlice, and to him they are much better known than loved. Pass them by, and let them rest in peace; we shall always be able to find them, therefore let them alone until a more convenient season. They are not insects either, for they belong to the Crustacea, and are much nearer akin to crabs and lobsters than to beetles and butterflies.

"Insects found under a stone"! After all, my young readers will say, what a misnomer, since none of them are insects, at least according to English authorities, neither the spider, nor *Iulus*, nor woodlice—only some little creatures that are skipping about like fleas—they *are* insects. Click, cliek, how they leap! Surely they must have a spring under their tails. "Springtails" they are well called, and these are very like *Macrotoma plumbea*. By means of the spring-like process situated at the end of the body, where the tail ought to be, and which is tucked under them, they can take prodigious leaps.

Some are lead-coloured, others are violet, with a pinkish tinge, and others paler still, according to age. Turn back the stone! All who desire to know anything about "Springtails" have only to turn back to SCIENCE-GOSSIP for 1867, and, at page 53, read what Mr. S. J. McIntire has so well written about them.

The trip into the garden did not furnish me this time with any but the commonest objects; just what anybody would find, at almost any time, by turning over a big stone. To a certain extent I was disappointed, but on further consideration I am satisfied on one point, that common as were the little creatures I met with, there is, after all, a very great deal about them that I don't know; and this resolution, as a consequence has followed, that I fully intend to make their acquaintance again. We are all of us very apt to despise common things, just because they are common, and for that reason know very little about them.

> "A poor brotherhood who walk the earth
> Pitied, and, where they are not known, despised."

THE LOVE OF NATURAL HISTORY.

A VERY readable, instructive little book, I believe, has been written, entitled "EYES AND NO EYES." I write the words, "I believe," because I have never met with the work myself; but a friend of mine was quoting it to a young lady, not long since, and her remarks recalled to my mind how often it had been my lot to meet with the mental blindness in regard to NATURE and the startlingly-beautiful objects that she every day, and in every place, presents to the thinking, appreciative soul, which "*No eyes*" is intended to typify.

The Bruce, in his lonely cell, had "*eyes*" for the spider. Men of fashion, and women of society, both educated specimens of humanity in their way, have often need of powerful glasses ere they can discover any beauty in natural objects. Even those members of the Great Family who are, from their vocation, supposed to teach others, while preaching sermons to their fellow-mortals on the truths of the written BOOK, are frequently unable to draw attention to the vast wonders and evidences displayed by the meanest form of creation, in the grand Library of Nature, thrown open to all who have "*eyes*."

How is this? Is it that we require to be specially educated to love and understand Nature, as we do ere we can appreciate Art? Must the bodily eye be tutored? or is the defect in the mental vision? I am disposed to think the root of the evil lies in the mind, and the love of Natural History should, to give pleasure, be really *instinctive*, although a knowledge of it can be obtained, and a certain amount of taste acquired, by culture.

But I am getting out of my depth. I sat down to gossip, just to relate some of the amusing errors a lack of natural-history knowledge occasionally leads folks into.

A sort of Bardic meeting—Eisteddfords they are called in Wales—was got up, not very long since, at a small Welsh town; indeed, it was more of a Penny Reading than an Eisteddford; and people were invited to write on given subjects, and judges appointed to decide on the merits of the varied papers.

One of the subjects was the "Sea-shore;" and doubtless the person or personages who suggested such a field fully understood the ground—were prepared, in fact, for a description of the ocean wonders to be met with in a walk on the beach. Not so, I fancy, the judge. I draw my conclusions from the remarks he made. He evidently considered animal marine life—the lower grades of it—a very contracted and poor matter to waste words on—sponges and sea-anemones far too insignificant to be written about. What added to the absurdity of the business was this—the individual who repeated the judge's remarks pronounced the word "sponges" like "spoon" with g-e-s as a tail to it; and endowed anemones with an unorthodox number of the second vowel in the English language—thus: "a-nee-mo-nees." The writer of the paper in question sat right in front of the critic, listening with undisguised fun to his would-be profound observations, whilst he—poor miserable mortal, unconscious of the author's presence—proceeded *ex cathedrâ* to denounce the meagreness of the topic.

Imaginary conversation, of course, next morning:—

Miss F.—"Do you really mean to say, dear Mr. G., that one of the papers was all about sponges and those flowers? Where could any one find a sponge here? and as to anemones, why it is quite ridiculous: they could not grow in the sand; I put a barrowful of manure with mine last year."

"Oh, Aunt," exclaimed a youthful voice, "*sea*-anemones are what Mr. G. alluded to."

"Well, child, never mind; I want Mr. G. to answer my question; not you."

"Yes, Miss F., I may say the paper was all about such meagre, paltry matters, with just a little respecting crabs, star-fish, and such-like stuff."

"Well, to be sure, now; when so much might have been written about our shore. There is that fine new terrace just facing the sea, you know; and a club in L—— have taken a building lease of the ground below, to build baths; and now I think of it, a few lines might have been put in about the good pickle Mr. Williams makes of the samphire he finds on the rocks here. And then there are the pier, and the steamers, and the heaps of provisions brought here in the season, and the loads of geese we send off——"

"And the surplus stock you keep, Aunt," interrupted the niece.

"Let me speak, child; I want to tell Mr. G. how I should have treated the subject, instead of writing about crabs and such-like ugly things."

"But, Aunt, the notice never specified it was this particular strip of sea-shore, just this mite of beach, that was to be described. It was the SEA-SHORE; and I should have read it as he did, and have written about the various animals found on the shores of Great Britain."

"Animals? Did you ever hear a child talk so foolishly? Call a crab and such-like ugly things animals!"

"Then what are they, Aunty dear? And just let me ask you to read a little poem written by a friend of mine. It begins thus:—

> "Oh, call not insects ugly:
> There never yet was one
> Of God's created creatures,
> Beneath yon glorious sun,
> Who did not show some beauty,
> Or play a wondrous part;
> For vice can only injure
> Proud man's rebellious heart."

Mr. G. looked shocked; but the "child," as her aunt called her, was not so easily put down by looks. She accepted the frown on that reverend brow as a challenge.

"Dr. Johnson," she blurted out, "called sponges 'the cradles of organic life.' There is a great deal that is most interesting to be found in connection with the animals found on the sea-shore. Yes, Aunt, I am sure of it. Do you think such men as Kingsley, Gosse, Lloyd, and a whole host of others, clever, great minds, would have devoted their time to a 'meagre subject,' and 'nasty, ugly things'? If you could but see the brilliantly beautiful flowers of the ocean in their native homes,—the shallow pools and on the rock-sides, or even in a good aquarium, you would never call them 'ugly' again."

"Your aunt said crabs were ugly, Miss Hetty, and I quite agree with her. A good heavy crab, well dressed, is a very nice dish; but those little crabs we see crawling about on the shore *are* ugly things."

"Then you will call the seaweeds nasty; the lovely feather-like *Bryopsis*, the exquisite *Corallines*, the bright crimson *Delesseria*, and the delicate lacy *Rhodymenia*."

"Good morning, Mr. G.," cried the Aunt, rising quickly from off her chair. "Come, Hetty, I am ashamed of you; but you'll excuse her, she is such a child." *Exit* Miss F., followed by the indignant Hetty.

I was once staying in a country house with a party of people. One of the ladies wrote for the papers; another, a married dame of high degree, wrote novels, high-life, fashionable-society books. There was naturally a great contrast between the effusions of the two—one matter of fact, the other high-flown and imaginative. I do not think the writer on natural history envied the other authoress at all; she seemed tacitly to recognize the superior power of fiction; and I have heard her lament her utter inability to write a readable tale; so the little incident I am going to gossip about was quite an unmerited piece of womanly spite.

We had just come in from a drive. "Mamma," cries young Hopeful, "do you know there is a new writer in *The Meadow* this week?"

"Is there?" said mamma, languidly, as if the fields of earth were beneath her notice; but Miss A. looked curious,—*The Meadow* was one of her papers.

"Yes, mamma, and it is about birds. Do you know, I think Lord P.'s kitchen-maid wrote it."

"I dare say she did, dear. Those are the class of people who write for the papers."

The rudeness of the speech was so gross that a dead silence ensued. Miss A. coloured, and saying she must take off her hat, left the room.

Next day I brought in five newly-hatched little yellow chicks from the hen-house in my garden-apron to the drawing-room.

"What darlings!" cried one. "Dear little fluffy things!" said another.

Mrs. —— drew near. I exhibited my treasures.

"What are they?" she asked.

"Chickens!" replied several voices.

She drew herself up stiffly. She thought she was being hoaxed in some way.

"Oh no; young chickens are like young birds or young white mice; they have no feathers on them for some days after birth."

This was so intensely comic that I could not resist saying, "I refer you to Lord P.'s kitchen-maid, if you doubt my word that these are young chicks. She is sure to be well up on such subjects."

Another time I saw a young lady run away from an enraged turkey-cock, crying out that a wild beast was attacking her; and on being told the name of her furious foe, she exclaimed:

"That a turkey! oh no, my good man," addressing the farm-servant, "I know a turkey too well; have seen too many at papa's table to believe that nonsense."

Nor is it very long since I saw a very pretty, but rather affected girl, in a perfect rage with the family doctor, because he would not believe that her brother's pet slow-worm had *stung* her finger with what she called "his poison-fang," and made it inflame so badly.

He assured her again and again that it was impossible, that the reptile had no poison; but she left the room in disgust, saying, "I shall drive over to Dr. T—— [a neighbouring M.D.]; he will not tell me that a snake can't sting."

Beaumaris. HELEN E. WATNEY.

THE LAW OF EARTHQUAKES.—Mr. F. R. Cape, of Philadelphia, has been studying the law of earthquakes. Writing to the *Post* of that city, he says: "For four years the earthquake periods have been announced, and I believe in all, or nearly all cases, verified. The recent earthquake periods were announced to friends in Troy, New York, with the remark that the principal October combination of earthquake forces was one of great violence. The first ran from the 12th to the 18th, second from the 25th to November 3rd. They are of two kinds, the premonitory and final shocks. It is but possible that the general slump on the 20th was the adjustment of one massive crust to the conditions resulting from the derangements of the first period. I rather think, however, that they were only premonitory of the approaching latter period, to occur about the last week of the present month. Tidings of earthquakes occurring, especially in shock localities, will be duly reported for that period, and your playful hint on the subject has prompted me to inform you beforehand, as I do with the utmost confidence."

ZOOLOGY.

Bats.—On the afternoon of the 20th November I saw a pair of common bats (*V. Pipistrellus*) flying about and catching gnats with great alertness. Is not this very late for them to be on the wing? Query: Is there any truth in the statement that, on holding a white handkerchief up, they will fly against it? I have several times tried, but always found it to fail.—*W. H. Soulby, Bingley, Yorkshire.*

Monkey and Dog.—A terrier and a monkey, belonging to R. W. Fox, of Penjerrick, have formed a strong mutual attachment, and are seldom separated by day or by night. The monkey mounted on Pincher's back often accompanies him in his rambles, not erect, as a lifeguardsman, but, more like one of Catlin's Indians (avoiding the arrows of a foe), lies at full length on his steed's back, holding tight with all fours. Jenny's tail, which, although not prehensile, serves somewhat like a crupper to steady herself, by bending against that of Pincher. If they meet a strange dog in their excursions, and Jenny has reason to fear that a duel is imminent, she jumps off, runs up a bank, or climbs a tree, until the coast is clear, and then remounts without help. Roberts, the gamekeeper on a neighbouring estate (Penwarne), informs me that while recently going on his rounds he saw a rabbit bolt from a hole followed by a strange animal, which he was about to shoot, when he observed its long tail, and that it ran towards Pincher (who was at a short distance), and was quickly on dog-back. Both were retreating from the dangerous neighbourhood, but Roberts sent his setter dog to bring them back, and soon made peace with both the little fellows sporting without a license. Roberts is persuaded that Jenny could be taught to turn out rabbits better than a ferret could do. He thinks that Pincher's scratching at the entrance of a hole is a signal for Jenny to inquire within. If Pincher enters a brake where he is invisible, Jenny gets into a tree where she is more likely to have a sight of his movements.—*C. Fox.*

Badgers from Penwarne destroyed last autumn many beehives at Tregedna (where the birds find a loving protector). These representatives of Bruin in England have torn in pieces thick deal planks on which some of the hives rested, and appear to have attempted to throw down strong posts on which others were raised out of their reach. Badgers are probably as eager to eat the brood of bees as their honey, as even the stings of wasps do not prevent their tearing out their nests in my orchard, to devour the larvæ and pupæ.—*C. Fox, Trebah, near Falmouth, Dec.* 23, 1870.

Uraster rubens.—Are not the "fish mouths" described by Mr. H. Ingall, in his interesting paper on this species, one variety of the pedicillaria? There are two distinct forms of these bodies on *U. rubens*. The larger somewhat resemble, when seen in profile, a pair of spring shears, and are scattered rather sparingly over the spaces between the spines. Besides these there is a smaller and very different form, much more numerous and clustered in groups round the spines, and which, I would suggest, are the "mouths" your correspondent observed opening and shutting. They are composed of two calcareous pieces, showing the characteristic reticulated structure of the Echinodermata, and each of which is prolonged backwards into a short tang, which crosses the tang of the corresponding piece, so that the two jaws play on each other like the blades of a pair of scissors. As far as my observation goes, they are only found in close proximity to the spines, and are most plentiful in the neighbourhood of the ambulacral avenues. Seen in front when in a state of activity they bear no very distant resemblance to the jaws of a fish; but whether they have any communication with the digestive organs, is, I should think, extremely doubtful. Both kinds of pedicillaria are enveloped by an extension of the general investing membrane, and unlike those of the Echinidæ, which possess a calcareous footstalk. Their use in the economy of the animal is, I believe, yet to be discovered. A prepared specimen of the integuments of *Uraster rubens* exhibits the spines, the pedicillaria, and the arrangement of the dermal plates to great advantage. It should be macerated in very dilute liquor potassæ for two or three days to remove the animal matter, then thoroughly washed, and dried under gentle pressure. The central disc containing the madreporiform tubercle, forms, when mounted opaque, a very beautiful and attractive object for very low powers, 3-inch or 4-inch. The integuments of other starfishes, as for instance the Sunstar (*Solaster papposa*), the Eyed Cribella (*Cribella oculata*), and the Bird's-foot (*Palmipes membranaceus*), may be treated in the same manner, and are all well worthy of a place in the cabinet. The arrangement and form of the spines vary greatly in the species named. The fascieuli of spines in the Sunstar and the small palmate spines of Palmipes are very curious.—*Edward Horsnaill, Dover, Jan.* 9, 1871.

Dipterous Larvæ under the Shell of a Tortoise.—On the 9th of November last, when engaged in removing the shell-plates from the carapace of a Greek Tortoise (*Testudo Græca*), in order to examine the sutures, I was surprised to find a number of small dead and dried larvæ between the plates and the bone. The tortoise had been dead for some years, and the plates had become loose from the drying of the shell. The larvæ

appeared to have actually eaten the bone, for its outer surface was gone, and the internal cellular structure exposed where they occurred. Thinking the parent insect had chosen rather an odd place in which to deposit its eggs, I sent the larvæ to Professor Westwood, of Oxford, who pronounced them to be those of a "two-winged fly, possibly of some *Tachinia*, or allied *Muscidæ*," and added, "The eggs were probably laid in such situation soon after the death of the animal."—*Robert Morton Middleton, Jun., The Bank, West Hartlepool, Jan.* 7, 1871.

The Food of the Weasel.—The Weasel (*Mustela vulgaris*) is popularly supposed to possess a somewhat fastidious palate, preferring game and poultry for his ordinary repasts, and only condescending to notice rats and mice and other small animals when pressed by hunger; so that incessant warfare is waged against him by gamekeepers and others on account of his presumed destructiveness. One day last autumn I, however, had an opportunity of disturbing one while enjoying his meal, which consisted, not of the brains of a pheasant or partridge, but of the carcase of a poor batrachian—a frog! He moreover evidently enjoyed his "game," for he returned to his repast on my standing quietly by.—*J. B., Dolgelly.*

Crass.—I have no doubt Mrs. Watney is right in stating that the powers of locomotion of her new pet are very limited; but some ten years ago, when walking over the sands between Ramsgate and Broadstairs I saw a crass about the size of a small plate basking in the rays of an autumnal setting sun. Anxious to take possession of him, I proceeded to dig him up with the blunt blade of a knife five inches in length; but the more I dug the deeper he went, till at last I found that I had made a great hole two-thirds full of sea-water. I therefore gave up the chase and returned home deeply humiliated at having been conquered by a "Crass."—*E. J. T.*

Great Bustard (*Otis tarda*).—At the meeting of the Zoological Society on the 3rd of January Mr. Tegetmeier exhibited and made remarks on a specimen, in the flesh, of a female of the Great Bustard which had been killed on the 29th December near Feltham, in Middlesex.

Pedicellariæ of Echinodermata.—If your readers will turn to my "Tenby" (pp. 232—251), and to my "Evenings at the Microscope" (pp. 339—346), they will see that Mr. H. Ingall's observations on *Pedicellariæ* (Science-Gossip, p. 9), *and a great deal more*, have been long ago anticipated. His suggestion of the use of these curious organs is also mine,—"that they are intended to seize minute animals, and to hold them till they die and decompose, as baits to attract clouds of *Infusoria*, which, multiplying in the vicinity of the Urchin, may afford it an abundant supply of food." ("Evenings at the Microscope," p. 346.) Not the slightest acknowledgment, however, is made of my observations or of my conjecture.—*P. H. Gosse, F.R.S., Torquay.*

Natural Selection.—At a millpond near the farm-steading of Manbean, Elginshire, there has been for years a colony of the Water-hen (*Fulica chloropus*, Linn.), protected, as far as possible, from the catapult of the schoolboy and the fowling-piece of idlers. These birds are now so tame that they daily feed with the poultry, and are not much disturbed by the approach of a stranger. One day, during the late continued severe weather, when a little dog was running about the edge of the pond, which was then, and had been for days, completely frozen over, four of these birds, aware that their wonted refuge was closed against them, seemingly without any unwonted effort, took to wing and perched some thirty or forty feet high on the surrounding trees. One of them walked stately and steadily for a few yards up a drooping branch of a larch. All the four showed, by their skill and composure, that they were not altogether from home in the airy retreat which, water-birds though they were, they had thus *naturally selected* under difficulties.—*G. G.*

Cyclostoma elegans.—Reeve and Tate both agree that this mollusk extends, in England, as far north as Yorkshire. I have found it at Boston Spa on the magnesian limestone; and it is given as a Scarbro' shell in Bean's list in "Theakston's Scarbro' Guide, 1843." I wish to work out the distribution of this shell in Yorkshire, and shall be glad of localities for it in that county. I should also like to know if it has ever occurred north of Yorkshire, or has ever been found on coast sandhills in that or any other county.—*Francis G. Binnie*, 8, *Low Ousegate, York.*

Cormorants in the Bosphorus.—Southerly winds have prevailed in the neighbourhood of Constantinople longer than usual at this season (Dec. 21) of the year, and have detained large numbers of vessels at their anchorage-grounds in the Bosphorus and other localities. Large shoals of fish have appeared near the Seraglio point, forced up the Marmora's swollen waters by storms, and have attracted a multitude of cormorants. The water for a large distance is literally covered with them; they are in thousands, fishing in compact masses, their black heads and necks dotting the waters over a great area near the Seraglio point, and then suddenly disappearing below the surface, as if all of them had vanished entirely, so consentaneous is the whole mass in diving after their prey. The fishermen are also taking large quantities of fish in the Bosphorus with hooks and nets.—*Robson, Orbakeny.*

BOTANY.

Polymorphic Fungi.—In the current part of *Popular Science Review*, a description is given of a species of *mucor* developed from the mycelium of the roseate *penicillium* of dead box-leaves. And in Mr. Lewis's report on cholera evacuations, recently published in Calcutta, occurs another similar instance of a *mucor* developed from the mycelium of a *penicillium*, the two observations thus confirming and strengthening each other.

Red Snow.—An interesting account of the substance so called is to be found under plate 241 in the 4th volume of Greville's *Scottish Cryptogamic Flora*. The minute plant, under the name of *Protococcus nivalis*, is figured and described, and the different theories and opinions which had obtained as to the nature and origin of this mysterious organism are detailed. In times past, red snow, and red spots on bread, and similar phenomena, for which no very satisfactory account could be given, inspired terror, and were considered as prognostic of evil.

Early Gardens.—The roll of the household expenses of the Countess of Leicester, a daughter of King John, goes far towards proving that gardens were more cultivated in the early ages than the paragraph quoted in Science-Gossip would lead one to suppose; green peas, beans, parsley, onions, fennel, and pot-herbs, being amongst the vegetables mentioned, although it is exceedingly probable that the gardeners of the period were monks. This same roll mentions only apples and pears in the list of fruit; but Matthew Paris says, when describing a very bad season in England, that quinces, cherries, plums, and shell-fruits were entirely destroyed; thus showing that in the year 1257 such fruits were grown in this country. The "*shell-fruits*" are supposed to have been walnuts, chestnuts, and common cobnuts. Oranges were not known in France before 1333, but they are mentioned in England as early as 1290—imported, of course, not grown in the country. Eleanor of Castile, Edward's queen, it is supposed, first introduced this fruit on English tables, and a dessert of that age would not appear at all out of date now.—*H. Watney.*

Henbane.—This is one of the plant-names which has puzzled Dr. Prior (p. 108, 2nd edition). The following cutting from the *Athenæum*, No. 2,182, August 21st, 1869, may prove interesting to some readers; it bears the well-known signature of A. De Morgan:—"Hanne-bane; Hyoeyamus. Here are two words wrongly spelt according to our notions. Our English word *henbane* is supposed to indicate a plant which is fatal to domestic fowls; but nobody makes out that the hens ever eat it. In Gerard's 'Herbal' (1597) *hanne-bane* is given as the only French word for what they now call *jusquiame*, from the Italian *jusquiamo*. In the Academy's Dictionary *hane-bane* and *hene-bene* are given as obsolete forms, for which reference is made to *jusquiame*. Neither *hanne* nor *bane* has separate recognition from the Academy, nor does either occur in any compound except one, so far as I can find. It may be suspected that a form of the old word is seen in that 'hebenon' with which the Danish Cain murders his brother. The Greek word means *hog-bean*. Now, *ὑο* is the crude form of *hog*, and *κύαμος* is *bean*; hence *ὑοκυαμὸς* (*hyocyamus*) should be the word, analogous with *ὑοπόλος*, *ὑοειδῆς*, &c. The common form *ὑοσκυαμὸς* (*hyoscyamus*), with the full genitive *ὑὸς*, is just such a word as we see in horse's-radish, cow's-heel, goose's-berry, &c. It is true that the insertion may only be intended to avoid a number of short syllables coming together, as seems to be done in *ὑσπόλος*, &c. But we need not preserve what to a Greek ear was only euphonic to the confusion of etymology. It would surely be desirable to write *hyocyamus*."—*R. T., M.A.*

Pansy.—In the additional remarks to the first edition of his "Popular Names of British Plants," Dr. Prior gives a reference to Chaucer,—"Assemblie of Ladies," v. 62, where we have "poure *penses*;" in Spenser's "Shepheard's Calendar," April, 1579, we have "pretie *pawnce*;" and in Milton's "Par. Lost," bk. ix., and "Lycidas" (these last three given in Richardson's Dictionary) we have *pansy*. William Webbe, in his "Discourse of English Poetrie" (1586), has, in his translation of Virgil's second Eclogue (p. 79, Arber's edition), *paneyes*; but on p. 84 (possibly owing to the requirements of his verse) he has "prety paunee." Does the dissyllabic form occur in earlier authors? In this same work we have also, p. 79, "broade Mary Goldes;" p. 82, "Daffadillies;" p. 84, "Gelliflowres sweete," "Cullambynes," "Cornation" (see Prior, p. 53), "Daffadowndillies," "Kyngcuppe," "deluce flowre," and in close connection with *cornation* we have "Wynesops."

> "Let us have the Wynesops
> With the Cornation that among the loue laddes
> Wontes to be worne much."

(See *Sops-in-Wine*, Prior, p. 216; also p. 38.)—*R. T., M.A.*

Shamrock.—This Linnæus, in his "Flora Lapponica" (edit. Smith, 1792), p. 230, states to be the *Trifolium pratense*. His words are:—"Hiberni suo chambroch, quod est Trifolium pratense purpureum, aluntur, ecleres et promptissimi roboris, *Mund. diæt.* 125, confieiunt enim panem e floribus hujus plantæ melleum odorem spirantibus, qui magis placet, quam qui ex spergulâ receusita paratur;" *i.e.* from the Corn Spurrey (*S. arvensis*). —See *Prior*, "Plant-Names," p. 210.—*R.T., M.A.*

MICROSCOPY.

Cells.—A slide with movable cover, better than either of those noticed in the last two numbers of Science-Gossip, is "Piper's Revolving Cover Slide." It is a mahogany slide with circular opening, and the cover is a bone disk, which is fixed to the side by a brass stud, near the edge of the cell, so that it can be turned on one side (as on a pivot) to view the object. They may be used for any opaque object, but are admirably adapted for mounting moss capsules to exhibit the hygrometric movements of the peristome. I have used the wooden box cells mentioned in Science-Gossip, February, 1868, for the latter purpose, but found the moisture from the breath condense upon the glass slide to which the boxes were attached; and another objection was, that the *loose* lids were not of one uniform size. A *loose* lid should be made to fit any box indiscriminately; but a revolving cover is, I think, preferable. This slide was invented by Mr. Piper, of the Old Change Society, and those I use were bought at Baker's, in Holborn.—*A. S.*

A New Mounting and Dissecting Microscope.—I have been lately using one of Mr. Field's Universal Mounting and Dissecting Microscopes in the preparation of objects, and find it so useful and so compact, that I think some of your readers may be glad to know of its existence.—*R. H. Nisbett Browne.*

New British Desmids.—Mr. Archer has recently brought before the Dublin Microscopical Club examples of new and rare Desmids; amongst which we notice *Sphærozosma secedens* (de By.), found at Kylemore, County Galway; also a species of *Staurastrum* allied to *S. lævе* of Ralfs, of which he, for the present, regards it as a variety (*Ctevei*). A species of *Euastrum* has been found, which accords with no described species in many features, but is allied to *E. ansatum* (Ehr.). At a succeeding meeting, Mr. Archer exhibited *Staurastrum maamense*, Archer, and *Micrasterias fimbriata*, Ralfs; both rare, and found in gatherings from Connemara. On other occasions, the same gentleman exhibited new and rare specimens of Desmids, and other minute algæ, and offered his opinion thereon. How is it that Mr. Archer finds his perseverance so well rewarded by the continual discovery of new and interesting forms in Ireland, and that in England no addition whatever is being made to our knowledge of the distribution, structure, &c., of these interesting algæ?

Scale of Minnow (*Leuciscus phoxinus*).—These scales are very minute and delicate; in fact, they require that the fish should be scraped with a penknife, and the scrapings transferred to a little water on a slide, and submitted to the microscope before they can be discovered. When found, the character of the scale is sufficiently distinct from all the others heretofore figured that it will not be considered too much trouble to pursue the course we have indicated in order to obtain them. Our readers will remember that we have already figured a considerable number of the scales of British fresh-water fishes in previous volumes. The series is not yet complete; there are several we should still like to add, and for these we await with patience the co-

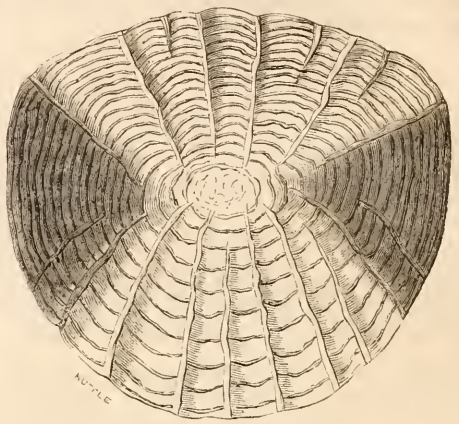


Fig. 22. Scale of Minnow.

operation of those of our correspondents who are interested in the subject. Positive accuracy in identification of species is indispensable. This is comparatively easy in some cases, as that of the Barbel, &c.; but where not so easy, it is prudent to submit the fish from which the scales are taken to some competent authority. Under these conditions we shall be glad of scales from all species not yet figured in this journal.

Structure of Insect Scales.—This subject has been much discussed of late, and, of course, there has been difference of opinion. In the "Monthly Microscopical Journal" for January appeared a paper by Mr. S. J. McIntire, illustrated by three page plates, containing numerous figures; and the eleven pages of letter-press abound with observations and suggestions of interest on the structure of these objects, hitherto so little comprehended or understood.

Microscopy in New York.—We learn that there are in reality two Microscopical Societies in New York City. The oldest is the American Microscopical Society of New York, which, for some cause or other, does not seem to have realized all that many ardent spirits desired; consequently the Bailey Microscopical Club was established, and is in such vigorous condition—so we are informed—that it threatens to "go-a-head, and beat all other Microscopical Clubs in the 'versal world.'" Move on, brother Jonathan, and good luck to you!

NOTES AND QUERIES.

Echinodermata.—Can any reader inform me in what part of England the large common Urchin, *Echinus sphæra*, is eaten, and how it is prepared? Forbes, in his work on the British starfishes, says, "Abroad, like its congener the true *Echinus esculentus*, it is much eaten, and Pennant says it is eaten by the poor in many parts of England." I would also like to know if Synapta is a widely-distributed British genus. A species, which I take to be the *S. inhærens*, occurs in immense numbers on the mud-flats in our lough. It has the exact shape of plates and anchor spines figured by Carpenter in his work on the microscope.—*W. S., Belfast.*

Tamarisk Manna.—For very many years it has been asserted that a kind of manna is produced in the East on some species of tamarisk. This assertion requires confirmation. One author after another repeats it, but can any one affirm from personal observation that such a substance is yielded by any species of tamarisk whatever?—*C.*

Is the Landrail a Bird of Passage?—The Landrail (*Rallus Crex*) is invariably described as a true migratory bird by naturalists; notwithstanding which I have the presumption to doubt the authenticity of the alleged fact, and am disposed to believe that its prolonged silence is mistaken for absence. Their familiar call ceases after the season of incubation, with other instincts of nature, and it is not improbable that at the approach of winter they retire to the wet moorlands and heaths, where food is more abundant, and return to the lowland meadows again as the breeding season comes round. In support of this opinion I have to state that on two or three occasions in the north of England, I have, in midwinter, shot specimens in a plump and fat condition, such as would negative the supposition that they were diseased birds left behind by their fellows. They took wing with great reluctance, after being tracked for a long time, and for a considerable distance by a setter; and any one who has witnessed their slow and heavy flight, incapable of maintaining their body in a position parallel with the plane of the horizon, but allowing it to form a considerable angle therewith, while their legs trail behind, cannot but have arrived at the conclusion that the Landrail is not endowed with the physical qualities necessary to sustain the prolonged flight entailed by a passage to other climes. I have to add that I was not mistaken in the specimens to which I have alluded, for I compared them with Bewick's illustration and description, and I know very well the distinction between the Landrail and its congener the Water-rail (*Rallus aquaticus*).—*J. B. Dolgelly.*

Teeth of Strepsodus.—In the Northumberland, Staffordshire, and Scottish coal-measures the teeth of a fish known as Strepsodus are not unfrequently found: their form is strikingly characteristic, being bent and recurved near the apex, a peculiarity which suggested the name of the genus to which the fishes possessing such teeth belonged. The teeth, in addition to being recurved, are beautifully striated longitudinally: the striations run in nearly parallel lines and only occasionally inoseulate. Some of the teeth of Strepsodus are free from striations, and it is not improbable that there are two species of the genus, one having striated and the other smooth teeth. An illustration of the tooth of Strepsodus appears in the "Transactions of the Manchester Geological Society," vol. i. p. 167, pl. 5, fig. 12; an illustration and description of Strepsodus from the pen of Dr. Young, is published in the "Quarterly Journal of the Geological Society," vol. xx. pp. 597, 603; and a description of the jaws and teeth of Strepsodus has been published in *Scientific Opinion*, vol. i. p. 556, vol. ii. pp. 13, 25, and vol. iii. p. 369. Until within the last few months little was known of the arrangement of the teeth of this fish; but discoveries of nearly perfect jaws in Staffordshire and Northumberland have proved that the general arrangement of both mandibles and maxillæ is a series of large laniary teeth at intervals of about half an inch; and in the spaces between the large teeth there are five teeth with the same characteristics as the large ones, but about half the size. I enclose a sketch of one of the larger forms of the teeth of Strepsodus (fig. 23).—*T. P. Barkas, F.G.S., Newcastle-on-Tyne.*



Fig. 23. Tooth of Strepsodus.

Shower of Blood.—In the beginning of July, 1608, a supposed shower of blood fell for several miles around the suburbs of Aix-la-Chapelle. The cause of this was discovered by M. de Peirese to depend upon the exudation of large drops of a blood-coloured liquid on the transformation of large chrysalides into the butterfly state. The drops produced red stains on the walls of the small villages in the neighbourhood, on stones in the highways, and in the fields. The number of butterflies flying about, too, was prodigious. These red drops were not found in the middle of the city, or in places where the butterfles did not reach. To the same cause M. de Peirese attributes (I think very correctly) some other showers of blood related by historians, that happened in the warm season of the year when butterflies are most numerous. Gregory of Tours mentions one that fell in the time of Childebert, in different parts of Paris, and upon a certain house in the territory of Senlis; and about the end of the month of June another likewise fell, in the reign of King Robert. Large drops of excrement, of the colour of blood, are voided by all the butterflies which proceed from the different species of hairy caterpillar. On one occasion twenty-eight chrysalides of *Vanessa Antiopa*, or Camberwell Beauty, which I had preserved in a small room, attached to projecting bodies, underwent transformation on a single day in July. The walls and floor were so bespattered with bright crimson-coloured fluid, resembling blood, as to give the appearance of a regular shower of the fluid.—*Odd Showers*, p. 31.

Electric Stockings.—Can any of your readers explain the following phenomenon? A relative of mine is in the habit of wearing two pairs of stockings, the upper, black spun silk, the under, lamb's wool. They are drawn off *together* at night, and on their being afterwards separated, a curious occurrence takes place. There has been during the intense frost more than the usual amount of electricity in them, causing a sharp pricking sensation up the arms of the person drawing them apart, and the stockings immediately become inflated, and when held near a wall incline towards, and finally adhere to, the wall; so that the four stockings remain hanging there without any visible support. Is this the result of the severe cold?—*E. M. P.*

The Laburnum was called Bean-trefoile tree in the time of Gerard, because the seeds are shaped like the bean, and the leaves like the trefoil. It had also the name of Peasecod-tree in that age, but which has long given way to that of the Latin *Laburnum*, which Haller says is evidently derived from the Alpine name, *Laubours*. In French it is named *Cytise des Alpes*, *Abours*, and Faux Ebénier, because the wood was often used as a substitute for ebony. —*Sylva Florifera*.

The Birch.—The books which Numa composed about 700 years before Christ were written on the bark of the Birch-tree; and if we may depend on the testimony of Pliny and of Plutarch, they were found in the tomb of that great king, where they had remained 400 years.—*Sylva Florifera*.

Dragon-flies in London.—I feel obliged to your correspondent J. R. S. C. for his plausible suggestion; and I must own that, at all events, a step in the right direction has been taken to clear up the mystery that surrounds the appearance of the Dragon-fly in our crowded thoroughfares. No doubt some of your readers have noticed, standing in a small plot of ground within a very few paces of Bishopsgate-street Church, a small fountain surrounded by a pool. Now last spring some flags and other aquatic plants were introduced into this pool; and it is highly probable that if their roots had been carefully examined, some eggs, or even a stray larva or two, would have been discovered. There may be many other little fountains of this kind in the metropolis, but I simply mention this particular one on account of its being but a mere stone's throw off Threadneedle-street, where, it will be remembered, I mentioned that a Dragon-fly had been captured. With reference to the dragon-flies that have from time to time made their appearance in town, having wandered from their native haunts to seek their fortunes in our busy streets, I think it improbable, though *quite possible*, that that could have been the case; and perhaps it is quite out of the question to suppose for a moment that such strong fliers could have been carried away by the wind. A friend of mine has suggested that they may have been brought down the Thames by boats that had been moored amongst the reeds; but I believe that could not have very well been the case. However, it is evident that the question as to how and by what means these Dragon-flies made their appearance in the metropolis has not yet been satisfactorily answered; and I fear it will remain an open question till the summer brings us fresh opportunities of investigating the matter more closely.—*S. A. Harry*.

Pigeon-Posts.—Perhaps it may interest some of your readers to know how the pigeon-post is managed. The pigeons to return to Paris are taken from that unfortunate city by balloon. The letters, &c., to be sent back by the birds are reduced to a very small size by photography, and secured to the centre tail-feather, which is stationary during flight, and carries the burden easily. The following extract from the *Daily News* of Jan. 13th will show what a large number of messages one pigeon can carry:—"Bordeaux, Jan. 10th.—M. Feillet, the director of the pigeon-post, tells me that no less than 30,000 public and private letters were dispatched to Paris to-day by one pigeon. Duplicates of these were sent by two other pigeons; so that in all 90,000 microscopic copies of letters were made. —*H. Budge*.

Aquarium Query.—For the last three months I have kept a carp and two gold-fish in my aquarium, which holds a little more than three gallons of water, and have planted *Anacharis alsinastrum* (Water-thyme), *Myriophyllum spicatum* (Water-milfoil), and *Vallisneria spiralis*, in mud, which is covered with small stones to the depth of about 1½ inch. I have also in it snails, beetles, &c. On some days the water is beautifully clear and transparent, and, perhaps, the next morning, without any apparent reason, I find the water so thick and turbid I can hardly see the fish: in about three or four days it becomes clear again. The change, so far as I can judge, takes place in the night, and I am quite certain does not proceed from the fish burrowing into the mud. In vain have I tried to account for this change, and am quite at a loss to find out its cause. Does it proceed from the fish, the weeds, the snails, or the beetles? Can any of the readers of Science-Gossip solve this difficulty?—*John R. Luson, Bushey Park Cottage, Teddington, S.W.*

The Dahlia was but little known in England until after the year 1814, when the peace enabled our nurserymen to obtain an additional supply both of roots and seeds from France, where the cultivation of these plants had been more attended to than in this country. The Count Lebeur, at Paris, and M. Otto, at Berlin, were the principal foreign amateurs who cultivated the Dahlia previous to 1809.—*Flora Historica*.

"Eye-stones."—When a girl I frequently visited a lady who had some of these stones; they were brought from Jamaica or Sierra Leone, I forget which. For fifty years I have been wishing to know what they were, but have not met with any one who knew anything about them, or had seen them. My own opinion is that they are *not stones*, and certainly from their form *cannot* be *shells*. I believe they are *opercula*. I have met with several of the exact form, though minute in size, in sand shaken out of sponge, and I have an operculum an inch in diameter of the precise form.—*F. C. R., Streatham Hill*.

Eye-stones (*Phasianella Pullus*). — The eye-stones mentioned by T. C. Izod, in the January number, p. 21, are no doubt the opercula of some species of Turbo, or one of the allied genera, perhaps *Phasianella*. They may possibly be intended to defend the mollusks against the attacks of crabs and other enemies. The widely distributed *Phasianella Pullus* is, I believe, the only British species possessing this kind of operculum, which usually belongs to inhabitants of warmer seas. Perhaps some of your readers can explain this singularity. My own idea is that this species, which is found abundantly in the tropics, may be a relict on our coasts of a warmer epoch.—*R. Egerton*, 31, *Victoria Road, Kensington*.

Who Killed Cock Robin?—In answer to correspondent "G. R." the entertaining and popular story of "Who Killed Cock Robin?" was written by Rev. — Mosely, who is still living, and is said to have received a very large sum of money from the sale.—*H. M. Damon*.

Darkling Spiders.—Two or three days after I had read Mr. Clifford's paper on "Darkling Spiders" in Science-Gossip for January, p. 12, I came upon the following remark in the first volume

of Nicholson's "Manual of Zoology":—"Many spiders, however, do not construct any web, unless it be for their own habitations; but hunt their prey for themselves" (p. 204).—*Edward Fentone Elwin, Booton, Norwich.*

Gregories.—In Maton's "Observations relative chiefly to the Natural History, &c., of the Western Counties of England" (1797), I find (vol. ii. p. 55), under Frithelstoke (Cornwall): "In a pasture east of the church we found *Narcissus pseudo-Narcissus* growing in vast profusion. The people of the village call these plants *Gregories*,—a name that struck us on account of its coinciding with the appellation of the order to which the neighbouring monastery belonged." Is this name still in use? It is not given in Prior, p. 61.—*R. T., M.A.*

Loose-strife (p. 19).—I cannot agree with Mr. Ernst that "Loose-strife," as applied to *Lysimachia*, is to be regarded as a "new-made plant-name." I find it in Bailey's English Dictionary (1728) and Miller's "Gardener's Dictionary" (1768), and think it will probably be found in most of the old Herbals.—*G. H. H.*

Climbing Rats.—A somewhat curious story, illustrative of the remarkable sagacity shown by some of our smaller animals, and which you may, perhaps, deem worthy of mention in your journal, was told me the other day by a near neighbour of ours. The facts are as follows:—The person to whom I allude has in her garden a particularly fine apple-tree, which had borne this season a goodly crop. Suddenly they began to disappear without any very apparent cause. She came at length, however, to the conclusion that they must have been stolen by some of the boys of the village, and accordingly thought no more of the matter. Some time after, the gardener, turning over a heap of rubbish placed in a corner not far from the tree, discovered in the centre a hollow cavity, in which were neatly stored the greater portion of the missing apples, a few being slightly gnawed, and exhibiting plainly the marks of the depredator's teeth. The rats must have climbed the tree, bitten off the apples, descended again, and finally stored them in the manner related, doubtless for the purpose of forming a winter horde.—*J. S. William Durham.*

Lime Deposit in Boilers.—Will "G. H. H." kindly tell me whether the recipe given in the January number, p. 23, for checking the lime deposit in boilers is equally appropriate when the water is used for drinking and cooking, as well as for washing purposes; or should it be applied in the *latter* case only?—*H. H. G.*

The Garden Oracle for 1871, edited by Shirley Hibberd, and published at the *Gardener's Magazine* office, is framed upon the old model, but embodies a number of improvements. It is nearly double the bulk of any previous issue of the same work, and is largely embellished with engravings, all of which are of a strictly useful character. This, the thirteenth publication of the "Garden Oracle," is characterized by a number of peculiarly attractive features; such as figures and descriptions, and selections of the most valuable garden vegetables and fruits, a series of selections of "pictorial trees" for parks, gardens, public promenades, and town enclosures, and a review in detail of the progress of horticulture in every branch of the art during the past year. Strange to say, the war has made its mark on this useful work, for it contains no announcements of new continental roses or gladioli, or any other of the many flowering plants which our near neighbours have been wont to supply our gardens with. But the editor has made amends for these deficiencies by ample notices of new inventions, and selections of the best varieties of trade articles of every kind for every imaginable purpose in connection with the garden and the farm.

Locust Ravages.—Some idea of the damage done to vegetation by locusts in tropical countries may be gathered from the following account of a raid made by them in an East Indian cotton plantation. The means adopted to repel them, was by recourse to the discordant sounds of native music,—horns, tom-toms, and pipes—aided by the waving of flags and branches of trees. These measures, undoubtedly, saved the produce; for, judging by the performance of the very small number that succeeded in gaining admission to one of the finest fields unobserved, had a full complement effected a lodgment, one hour would have sufficed to strip every tree of its leaves, though the foliage was abundant, and the plants in one field from 5 to 6 feet high. The immunity which the native Indian cotton enjoyed from the attacks was considerable, considering the avidity with which they devoured the exotic descriptions; and, true to their early traditions, the Egyptian was evidently an especial favourite. Some of the swarms that passed over the country at that time were exceedingly numerous. The arrival and settlement of one mighty mass was a remarkable sight. What was first observed was a sort of haze on the verge of the horizon, in a long line, as if a steamer had passed and its smoke was rising into vapour; this was some hours before the insects arrived. The cloud gradually thickened, and rose higher as they approached. When they got fairly overhead, the air became darkened as if night was setting in, it being yet mid-day, and the peculiar sound which accompanied their flight resembled that of the rustling of the leaves of the Peepul-tree when agitated by light winds; but it is not until they have settled down that any idea can be formed of the immensity of their numbers; and the early dawn, before sunrise has warmed them into life and motion, is the time to witness this most extraordinary sight. In the instance now referred to, the appearance the face of the country wore would be best described by supposing that a tolerably heavy fall of snow had taken place, only that the colour of it was a light brown, and this extended for miles, as far indeed as the eye could reach. Trees were favourite perching-ground for the night, and the manner in which they contrived to crowd upon them, piles over piles, concealing every vestige of leaf and branch, gave the trees a singular appearance. At one spot a stout and wide-spreading branch of a banyan-tree had snapped at its stem from the incumbent weight of the insects. —*Gardener's Chronicle* (1871), p. 70.

Bother the Pigs!—We learn that as the goats destroyed the indigenous vegetation of St. Helena, so now the pigs are rooting out, or promising obliteration, by destroying the seeds of the most interesting plants of Norfolk Island. The noble Norfolk Island Pine (*Araucaria excelsa*) is likely to disappear before the pigs, which roam everywhere, greedily devouring the seeds as soon as they fall to the ground.

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer,* not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them. We do not undertake to return rejected manuscripts unless sufficient stamps are enclosed to cover the return postage. Neither can we promise to refer to or return any manuscript after one month from the date of its receipt. All microscopical drawings intended for publication should have annexed thereto the powers employed, or the extent of enlargement, indicated in diameters (thus · × 320 diameters).

A Parisian Diatomist is informed that we can tell him nothing of Eulenstein's "Diatomaceæ."

A. L.—A letter awaits your address respecting Ligurian Queens.

H. D.—Gardner's "Taxidermy," about eighteenpence; sold by Mr. Gardner, of Oxford Street, London.

S. F.—1. *Lecythea Ruborum* with *Phragmidium bulbosum*. 2. *Uredo Potentillarum*. 3. *Puccinia glechomatis*.

W. Geddes.—Please send address to F. Sneyd.

Miss S.—We cannot undertake to name animals from a tuft of hair.

H. E. S.—We cannot determine without more extensive examination than we can devote to one correspondent.

H. D.—No. 1. *Adiantum affine*, Willd. No. 2. *Aspidium angulare*, Willd.? Not enough to determine the species.—*J. G. B.*

R. H. N. B.—No. 1, not a fungus, but diseased state of the tissue. No. 2. *Rhytisma acerinum*, a very common fungus, but immature.

E. S.—A very young Nudibranch, apparently one of the many oceanic species of *Eolis*.—*J. H.*

J. S., Jun.—No. 2. Too small for determination. No. 3. Probably *Sertularia cupressina*, but too small to see the habit.

A. C. S.—This slide contains *Arachnoidiscus Ehrenbergii* of Bailey. *A. Japonicus* of Shadbolt is the same as *Hemiptychus ornatus*, Ehr.=*A. ornatus*, Ehr. *A. Ehrenbergii* has no transverse costæ, and the granules are large (these, however, if examined with a 500 or 600 and oblique light, will be found to consist of several smaller granules). *A. ornatus* has transverse costæ, and small but distinct granules. See Arnott's paper in *Mic. Journ.*, vol. vi. p. 162.—*F. K.*

S. B. T.—It is a fungus called Jew's ear, *Hirneola auricula Judaæ*.

Y. F. N. H. S. C.—Please send advertisements to Publisher with full name and address.

Mr. P. (Worcester).—The publisher remembers no query remaining unanswered.

Sowerby's Botany.—The publication of this work has been resumed, and the Grasses are being issued. Part 79—the second of the new volume—will be ready at the same time with this journal.

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Wanted, a small quantity of "Bermuda earth" in exchange for mounted diatoms.—Robert Cooke, Jun., Egremont, near Birkenhead.

Polyeystina.—Good slides offered for slides of sponge spicules, except *Spongilla fluviatilis* and *S. lacustris*.—W. Freeman, 165, Maxey Road, Plumstead.

Mosses.—*Hookeria lætevirens* and others for rare mosses or lichens.—Send lists to R. V. T., Wisheil, Bodmin, Cornwall.

Mosses.—*Fissidens exilis*, &c., in exchange for other mosses.—Send lists to J. Bagnall, Jun., 102, New John Street West, Birmingham.

Fine *live* specimens of the European Water-tortoise (*Emys lutaria*) given in exchange for *live* specimens of the common or smooth Snake, Green Lizards, or other *live* British or foreign reptiles.—W. A. Shoolbred, Jun., Tettenhall Wood, Wolverhampton.

Plerospora Andromeda.—Seeds of this rare parasitical plant, neatly mounted, in exchange for any other named slide of interest.—Send slide to E. Ward, 38, Bradford Street, Coventry.

For skin with scales of Eel-pout (*Lota vulgaris*), send stamped addressed envelope to G. E. Quick, Long Lane, Southwark: any object of interest acceptable.

Seed of *Eschscholtzia Californica*, *Antirrhinum majus*, *Bartonia aurea*, *Œnothera biennis*, *Tomato*, and *Bertula verrucosa*, for others.—J. Needham, Jun., 27, Approach Road, Victoria Park.

Bombyx Pernyi.—Cocoons and eggs of this magnificent silkworm for tubers of Dahlia and Gladiolus, or other roots.—W. Tyson, 14, Hanover Street, Leeds.

Skin of Eel from Lough Neagh, and crystals of Yeolite from the Giant's Causeway, prepared for mounting as polariscopic objects, for any good object.—W. Gray, 6, Mount Charles, Belfast.

Echinus Spines, small, unmounted.—Send stamped directed envelope, and any object of microscopical interest to W., 65, Wigmore Street, London, W.

Fossils from the Marl Stone, Inferior Oolite, and Chloritic Marl, for others from different formations; also, rock specimens (West of England) for others.—F. C. Maggs, Yeovil, Somersetshire.

Uric Acid and other urinary deposits. Good slides of these for other good mounted objects; named diatoms preferred.—W. Overbury, King-street, Norwich.

BOOKS RECEIVED.

"The American Entomologist and Botanist." December, 1870.

"The Animal World." No. 16. January, 1871.

"The Gardener's Magazine." Part 61. January, 1871.

"Boston Journal of Chemistry." January, 1871.

"Land and Water." Nos. 258, 259, 260.

Hooper & Co.'s "Seed Catalogue" for 1871.

"The Popular Science Review." January, 1871.

"The Monthly Microscopical Journal." January, 1871.

"Wonders of the Human Body," from the French of A. le Pileur, M.D.; illustrated by 45 Engravings, by Léveillé. 12mo. Blackie & Son. 1871.

"Odd Showers; or, an Explanation of the Rain of Insects, Fishes, Lizards, &c." By Carriber. London: Kerby & Son.

"The Doctor." No. 1. Jan. 1871. London: Baillière, Tindall, & Cox.

"Birds and Flowers," by Mary Howitt, with 87 drawings on wood by H. Giacomelli. London: Nelson & Sons.

"The Sea and its Wonders," by Mary and Elizabeth Kirby. London: Nelson & Sons.

"The Garden Oracle and Horticultural Year Book" for 1871, by Shirley Hibberd. Gardener's Magazine Office, 11, Ave Maria Lane.

"On a Localized Outbreak of Typhoid Fever in Islington during July and August, 1870, traced to the use of Impure Milk," by Edward Ballard, M.D. London: J. & A. Churchill.

"Microscopic Objects," figured and described by John H. Martin. London: Van Voorst.

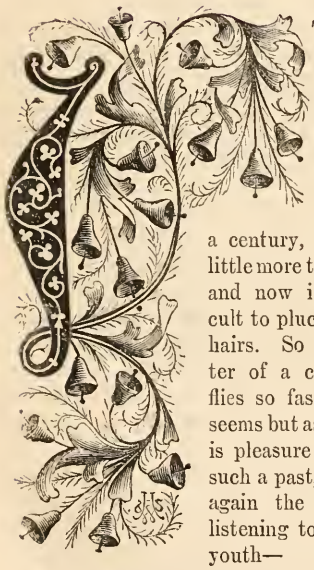
"The Dental Register." November, 1870.

Communications Received.—E. F. E.—H. E. W.—E. H.—J. E. T.—T. P. B.—E. M. P.—R. E.—R. V. T.—E. J. T.—R. M. M.—H. D.—H. R. W.—J. E.—C. R.—W. F.—R. C.—H. E. S.—C. F.—J. R. L.—S. F.—A. H.—J. B.—F. S.—J. B. D.—J. R. S. C.—A. S.—H. M.—E. W.—S. A. H.—H. E. W.—H. E. R.—G. E. Q.—G. H. H.—R. H. N. B.—I. G. B.—H. M. D.—J. N.—P. H. G.—J. S. W. D.—F. G. B.—J. H.—C. H. R.—W. T.—G. G.—W. A. S.—A. G. H.—C. J. W. R.—H. P.—H. B.—E. S.—R. B. S.—W. G.—J. W.—H. H. G.—A. E. M.—Y. F. N. H. S. C.—S. B.

"ON THE BROAD."

"And the creeping mosses and clambering weeds,
And the willow branches hoar and dank,
And the wavy swell of the soughing reeds,
And the wave-worn horns of the echoing bank,
And the silvery marish-flowers that throng
The desolate creeks and pools among,
Were flooded over with eddying song."

TENNYSON.



T was a fine summer evening — ah! how long that evening was ago we scarcely care to tell. It may be that it was a quarter of a century, for then we were little more than boys together, and now it would be difficult to pluck out all the grey hairs. So it *must* be a quarter of a century, but time flies so fast with us that it seems but as yesterday. There is pleasure in contemplating such a past, in dreaming over again the enjoyments, and listening to the voices of our youth—

"When falling on our weary brain,
Like a fast falling shower,
The dreams of youth come back again;
Low lisping of the summer rain,
Dropping on the ripened grain,
As once upon the flower."

And this summer evening, with its calmness, its quietude, its peace, its golden sunset, revives again. Why should that particular evening be so well remembered, and so many others forgotten? It was an evening "on the Broad."

All who have lived in Norfolk, or made this county the scene of holiday trips, will know well enough what a "broad" is, and those who do not know from experience, will have learned, perhaps, from some such a book as Stevenson's "Birds of Norfolk." A few there may be who do not know that there are large expanses of water, small lakes if you will, though shallow, connected with the river system. Sometimes they are beside the river, and are entered by a "gatway," as at Wroxham; or they are expansions of the river itself, as at Barton: in either case it is the water of the river which has flowed over a large depressed tract of land, and permanently converted it into a shallow lake; not amid the mountain scenery such as one encounters in Wales or Cumberland, but with nearly a level horizon all around, in the midst of a flat or slightly undulating plain. Be not uncharitable, O reader, to hint of marshes and fens. There *are* marshes, and what might be termed fenny districts, but there are cornfields, and there are "broads." In these "broads" are a multitude of fishes, and on the evening in question we did "go a-fishing." Strict disciples of old Izaak would have despised us for our lack of science, but not for our want of zeal; for our "tackle" perhaps, but not for our "take."

It often surprised the "complete angler" to see how we country bumpkins, in our plain way, managed to beat them on our own waters in the bulk of fish taken. At least, it did so a quarter of a century ago; they may have discovered the secret since.

Barton Broad is long and narrow, and, taken in conjunction with Irstead Broad, forms a considerable expanse of water. In those days we had rather an exaggerated notion about it, which was pardonable, and considered it a lake. Since then

we have seen Bala, and become humbled as to dimensions, but with no ardent desire to forsake our old love. It may be from association, it may be from some other hidden reason, but we love the old "Broad" the best. In the middle of the "Broad" is a flat artificial island, about fifty yards square, and from this, in two opposite directions, a bank of reeds extends to the shore separating the two broads. In later times the bank of reeds has been kept cut down, so that the broads are continuous; but in those days there were only three openings or gaps through which boats passed, and these were the channels, or deepest part of the Broad. So shallow are some parts that these channels are indicated by posts at short intervals, in order that wherries and other large boats may not run aground. On the evening in question, we were moored in a very comfortable rowing-boat at one of these gaps to which allusion has been made. It was a comfortable boat for our purpose, that is, it was broad and flat, not very swift, but very steady. There were two or three of us, well equipped, as we always were, for the occasion, with something to eat, plenty to drink, and a satisfactory supply of "the weed." An angler not addicted to smoking is a pitiable object; but such were none of us. This county is well remembered for its hospitality and its stanch fare. A day's fishing on the Broad was always provided for on the most liberal scale by the presiding genius of these excursions. By a merciful dispensation, the demands upon our attention by the finny tribe seem to have corresponded in an inverse ratio with the demands of our stomachs. The fish became indolent between the hours of twelve and three, and we were usually "sharp set" at about the same period.

The onslaught upon sandwiches, hard-boiled eggs, and "home-brewed" was alarming on such occasions. How thoroughly we enjoyed these *al fresco* dinners, is also a thing of memory. Of course there were incidents connected with these, which make some special occasions more memorable than others. One above the rest is so deeply impressed on the memories of all then present that it has never been forgotten. The thing itself was not a miracle, but it would be folly in any one to attempt to picture it, as it still lives in our minds. We were, as usual, retired to a shady spot for our purpose. The boat was drawn close under some overhanging bushes on the bank of the river, a short distance from the Broad. This spot is known as Irstead Shoals. There are some cottages a few yards from the river, and as usual they contained children amongst their inmates. One of the most vigorous of our party was an old bachelor, as we regarded him then, and long after, of eccentric neatness, and a scrupulous regard that everything should be done in decency and order; if a fly dared to alight on his well-brushed pants without permission, it certainly dared not to stay there. We called him the "Abbot;" it might have been from his celibacy, or from his love of good cheer, yet it was from neither. But thereby hangs a tale.

We were seated comfortably, lines all out ready for catching a stray "nibble," and dinner in progress. By-the-bye, it was an axiom with us that if nothing had troubled us for an hour previous, there would certainly be fish to tantalize us during the mid-day meal, and if any were caught, the chances were greatly in favour of their being "bream," just because the slimy creatures would compel us to wash before the meal was resumed. To the Abbot this was a consummation *not* devoutly to be wished. What the course consisted of on the occasion in question, memory does not inform us, but, in the midst of its enjoyment, a large "pat" of mud came flying over the bushes behind us, and settled plump in the middle of the Abbot's plate. Ye gods and little fishes, what an explosion! Who shall venture to depict the consummation! The mischievous little urchin made the best of his way out of our reach, and the incident was swept into our dreams for ever.

The evening in question was a beautiful one, the water clear and smooth as glass; as we glided over its surface, we looked down upon acres of the water-soldier (*Stratiotes aloides*), not half a yard below, like a vast pit of young aquatic pineapple plants. It is a curious plant, perfecting its flowers and becoming fertilized by a special arrangement in the water. And what a delightful shelter it afforded to the finny denizens of this miniature forest. Wherever there is a bare spot, what shoals are constantly passing in and out the neighbouring weeds; but woe to him who attempts to angle over the unresisting vegetation. Some parts of the Broad have a bottom of bare gravel, others of black oozy mud, which gives no uncertain odour whenever it is disturbed, and some are nearly grown up to the very surface with weeds.

It was after five o'clock when the true sport of the evening commenced. The boat was moored head first to a post at one of the "gaps," nearest to the Barton side, the stern floating out into the channel, so that by means of a little dexterity we could "throw in" close up to the reeds and "boulders" (*Scirpus lacustris*). Why are these long rushes called boulders? Never mind! look to our business, for a sharp evening's work lies before us. As we lay ready for action, it was pleasant to look around on the placid water, margined on all sides with reeds and rushes; beyond these were alder bushes, here and there aspiring to be called trees. Behind us stood the imposing tower of Barton church, sharply defined against the sky; to the right, the homely little church of Irstead; to the left, far away, on rising ground, the tower of Staltham church; and from before us came the merry, merry peal of

Catfield bells,—four churches nearly placing us in the centre of a cross; but to none of these did we owe so much at such a time as the latter. To hear the music of these evening bells, "by distance mellowed o'er the waters sweep," is enough to recall nowadays many happy hours, when we listened to them in the heyday of youth, before care had marked—never mind!

Our rods for boat-fishing were light walking-stick rods, ending in a braided silk line, with light swan's quill float; and, oh! tell it not in Cockney-land, a pair of hooks dangling at the end. It requires a little practice to throw a pair of hooks just up to the edge of the weeds, within two or three inches of them, or into a bare spot, apparently not much larger than a hand-basin, and not catch the reeds instead of fish. To hook well into a reed in the midst of good sport is no joke; you may tug and manœuvre to your heart's content, and have no sign of clearing, unless by leaving the hook behind, until at last, in desperation, the boat is quietly dropt down, and the release accomplished. Of course no sport follows for some time. What sport? Why, catching "roud" to be sure! Just such a quiet evening, of all others, is the time to make a good bag of this fish. It is the "rudd," or, as locally called, the "roud" (*Cyprinus eryophthalmus*). The edge of a reed bank is their delight, as well as a calm evening, when they will swim out and in amongst the reeds, knocking against them as they pass, so that all the reeds seem to be trembling in unison. They are a beautiful fish, with their golden sides and crimson fins, especially when just fresh from their native element. We seldom had more than ten or twelve inches of foot-line between the hooks and the float; one hook hanging an inch or two below the other, each baited with a ragged scrap of worm. Roach often float amongst them, so that a stray roach or two comes in with every score or two of rudd. Their bite is so distinct that it is quite sufficient for determining to which species the fish belongs. With roach the float goes bob-bob-bob, straight up and down; but directly a rudd touches the bait, off he swims with it into the reeds,—the float is sloped at an angle of 45° and glides off. Two at a time, over and over again, up they come, as fast as we can work, hour after hour till it is deep into the night. Sometimes the merest shred of sodden skin of worm conceals the tip of the hook, but, no matter, it is taken, and again they rise in pairs. The sun is fast sinking when the sport begins, and gradually the gloom deepens, until at length it is impossible to see our floats as we stand; so we crouch down to get them sideways or to bring them into the reflection of some lighter part of the sky; two or three of us crouching together at the stern of the boat, constantly whipping in the garnished hooks, and whipping out the golden rudd. It was not always that we could secure such sport, but we have done so on more than one occasion. Who could think of time, or even of the "eternal pipe," under such circumstances. At length, unable to see the floats by any effort, we trusted awhile to the tug at the end of the line, and many a good fish was the reward of our labour. "And you call that angling?" half inquires some very scientific brother of the craft. "Call it what you please," is our only answer; "we caught the fish, and we thoroughly enjoyed it, and you could do no more."

In all seriousness this was a remarkable evening "on the Broad." As we prepared to draw off for the night, we heard the distant oars of friends coming off in boats in search of us. Alarm had been taken at home on account of the lateness of the hour; it was believed that something serious had happened, since it is quite possible to be drowned, and very easily too, "on the Broad."

The fish, which had been cast into the bottom of the boat as they were caught, had to be gathered up, but it was too dark to see them. By dint of feeling, the majority of them were stowed in baskets, and, when we reached the shore, we bore them between us, slung to a pole and carried on our shoulders. How many, or what weight there was, no one can tell with exactitude; but there is a faint recollection that when counted out by candlelight, the number was about three hundred, some a few ounces, and many from three-quarters of a pound to a pound in weight, and only three rods had been at work, for not more than three hours. As we rowed off joyfully, singing "Row, brothers, row," we did not feel at all disposed to quarrel with anybody. Old "Snuffers" himself would have been treated with affection, instead of grim condemnation. After a good day's sport your true angler is one of the best-humoured of all "jolly good fellows."

And thus ended our evening "on the Broad." Let no one condemn us for cherishing this vision of the past in our heart of hearts, as one of the pleasant reminiscences of youthful days. There is pleasure to be derived from such dreams, and even the realities of our present days *may* in the future give us occasion for dreams. It may be that these dreams will excite pleasurable emotions, or it may be painful ones. Much depends on the contrast which after-years may afford to the present. Ask an old naturalist to cull from his memory scenes of his most robust enjoyment in the past, and it seems to us exceedingly probable that some country excursion, in the enjoyment of the hospitality of a friend, will give the most vivid dreams. Cockneys think that moors, and fens, and broads must be dreary places for a man to withdraw into for enjoyment; and so they would be to the despondent and melancholy; but, in the vigour of health and in good companionship, and with a purpose withal, to furnish occupation, commend us to a day "on the Broad."

SEA-FANS.

By Major Holland, R.M.L.I.

PLINY appears to have been the first writer who published anything about these zoophytes: having mistaken them for mineral trees, he named them *Gorgoniæ*, after those alarming young ladies whose snaky locks turned all beholders into stone. We have lately seen some astounding things in the way of chignous; seaweeds, beetles, creeping things, and fowls of the air, have been fastened about the heads of fair ladies, often with marked effect; but a *coiffure à la Gorgone*, even in these sensational times would petrify everybody with astonishment; "a sweet thing in vipers," or "a recherché production in asps," may, however, one of these days be submitted to the judgment of a discriminating public by some enterprising Mantalini.

From the time of the great Roman naturalist, who, by the way, was an admiral "on active service and full pay," commanding the squadron at Misenum, when his devotion to the phenomena of volcanic eruptions cost him his life, A.D. 79, —little or nothing was said about them until A.D. 1706, when Marsigli, having satisfied himself that they were not arborescent stones, announced to the *Académie des Sciences de Paris* that they were plants, producing flowers which expanded in water, but closed when the branch was exposed to the air.

The French claim for a Frenchman, *Peyssonel, médecin-botaniste du Roi*, the sole and entire honour of having first discovered and demonstrated their animal nature. Peyssonel came across them while studying the marine flora of the coasts of Provence and Barbary. The Museum of Natural History of Paris possesses the manuscript of his "*Traité du Corail*," written A.D. 1727, in which corals, madrepores, lithophytes, and sponges are discussed. He shows that the zoophytes are "*des agrégations d'animaux*," and compares them to the "*orties de mer*," whose nature was then fairly understood. Let us read the account of his first experiment upon them in his own words:—"J'avais le plaisir de voir remuer les pattes, ou pieds, de cette ortie; et ayant mis le vase plein d'eau, où le corail était, près du feu, tous ces petits insectes s'épanouirent. Je poussai le feu et je fis bouillir l'eau, et je les conservais épanouis hors du corail; ce qui arrive de la même façon que quand on fait cuire tous les testacés, tant marins que terrestres." This remarkable manuscript, though never published in France, appeared in "Philosophical Transactions," A.D. 1756. This production of the medical botanist of "*Louis-le-bien-aimé*" was followed by the valuable memoir of Cavolini, "*di Polipi marini*," published at Naples A.D. 1785, and still quoted as authoritative by writers of the present day.

There are, perhaps, but few among us who, using the microscope either as a scientific instrument or as a toy, cannot boast of the possession of a well-mounted slide or two neatly labelled "*Gorgonia Spicules*"; some of us have followed Marsigli's lead, and have been satisfied that they are vegetable productions allied to *raphides*, which they somewhat resemble, and very few, indeed, can possibly have seen the animals themselves in their legitimate habitat. The bibliography of the order, though very extensive, is imperfect and unsatisfactory, widely scattered about in isolated disconnected papers, straggling here and there through half a waggon-load of books altogether out of the reach of ordinary mortals. The *Gorgoniadæ* everywhere inhabit deep water, and abound in the Mediterranean, and especially in the warm seas of the West Indies and of the Malabar coast. In our chilly waters they are comparatively scarce; five species only have been admitted into our catalogue in "Johnston's British Zoophytes," the best monogram, probably, on the subject. The right of two of these species to claim our nationality is somewhat doubtful; of the remaining three, one only, *G. verrucosa*, is at all common; the others are more or less rare; rarer still are the energetic individuals possessed of means and opportunity who take the trouble to go and fish them up alive; and rarest of all are the specimens which, after having been brought up from the mermaids' gardens, will consent to live long enough to allow anybody to observe them thoroughly. The shrivelled, wizened, dried-up mummies brought home by sailors "from furrin parts," and sold by them to the Jews and curiosity-shops, have nearly always lost their natural colours and assumed others; the fleshy covering has dried up into a friable crust upon the horny stem, and crumbles into dust beneath the fingers; shrunk and withered, they bear no more resemblance to the living "animal-flowers" than the "Rigwoodie hags" of Tam O'Shanter to the Queen of Sheba. We have dredged up some of the gayest and brightest of them in the Bay of Bengal; we have seen them brought up by the pearl-divers in Ceylon, and by the Malay trepang-divers of Singapore. The trepang, or *Biche-de-mer*, which forms an important article of export from the "Straits Settlements" to China, preys upon the fleshy coat of the sea-fans and corals,—at any rate, pieces of the branches are almost invariably found in its stomach.

In the hope of helping some of our readers to appreciate more truly the specimens in their cabinets, and of directing others to higher sources of information, we have attempted to patch together a few scraps and odds and ends of notes respecting them.



Fig. 24. *Gorgonia pinnata*, × 3. After Forbes.

The *Gorgoniadæ* have been classified under the head *Polypifera* by Lamarck, and are placed in the sub-class *Corallaria* by Milne-Edwardes: our own countryman, Dr. Johnston, in the work we have cited, places them in the order *Anthozoa Asteroida*, where they occupy a place between the *Pennatulidæ*, or "sea-pens," and the *Alcyonidæ*, or "dead man's fingers." The popular name of "Sea-fans" is given by fishermen to the flat-growing species of Gorgonia, such as *G. flabellum*, sometimes called "Venus's fan"; while the bushy-branched varieties of the order are called by them "Sea-shrubs."

Ray, in his "Wisdom of God in Creation," p. 77, says, "Those plants that grow deepest in the sea all generally grow flat in manner of a fan, and not with branches on all sides like trees; which is so contrived by the providence of nature, for that the edges of them do in that posture with the most ease cut the water flowing to and fro; and should the flat side be objected to the stream, it would soon be turned edgewise by the force of it, because in that site it doth least resist the motion of water; whereas, did the branches of these plants grow round, they would be thrown backward and forward every tide. Nay, not only the herbaceous and woody submarine plants, but also the *lithophytes* themselves, affect this manner of growing, as I have observed in various kinds of coral and pori." The term "*lithophyte*" is now applied to those animals only which possess a hard, stony axis, generally composed of carbonate of lime. The term *keratophyte* (κέρας, horn, and φυτὸν, plant) has been more recently adopted for those with horny flexible stems, such as the Sea-fans. In *Isis Hippuris* (fig. 31), the central axis is alternately composed of horny and calcareous substances, exhibiting masses of the latter united at intervals by a flexible material, allowing the stem to bend freely in every direction: "The object of such diversity in the texture of the polypary of the *Corallidæ* will be at once apparent when we consider the habits of the different species: the short and stunted trunks of *corallium*, composed of hard and brittle substance, are strong enough to resist the injuries to which they are exposed; but in the tall and slender stems of *Gorgonia* and *Isis*, such brittleness would render them quite inadequate to occupy the situations in which they are found, and the weight of the waves falling upon their branches would continually break in pieces and destroy them. This simple modification, therefore, of the nature of the secretions with which they build up the skeleton which supports them, allows them to bend under the passing waves, and secures them from otherwise inevitable destruction."

From the reticulated framework of the typical fan of *Gorgonia flabellum*, we pass on to other forms, in which by degrees all trace of outward resemblance to the popularly-named species is lost. The general outline of *Gorgonia placomus* is flattish, its branches are disposed in a dichotomous order, but though they incline towards each other, they rarely unite and form a network. In *Gorgonia verrucosa*, the most abundant of our British species, the general outline is somewhat fan-shaped, but there is no approach to reticulation.

In *Gorgonia pinnata* (fig. 24) it requires a considerable effort of the imagination to trace any resemblance to a fan.

In the French example *Gorgone verticillaire* (fig. 26), in which the polypes are arranged round

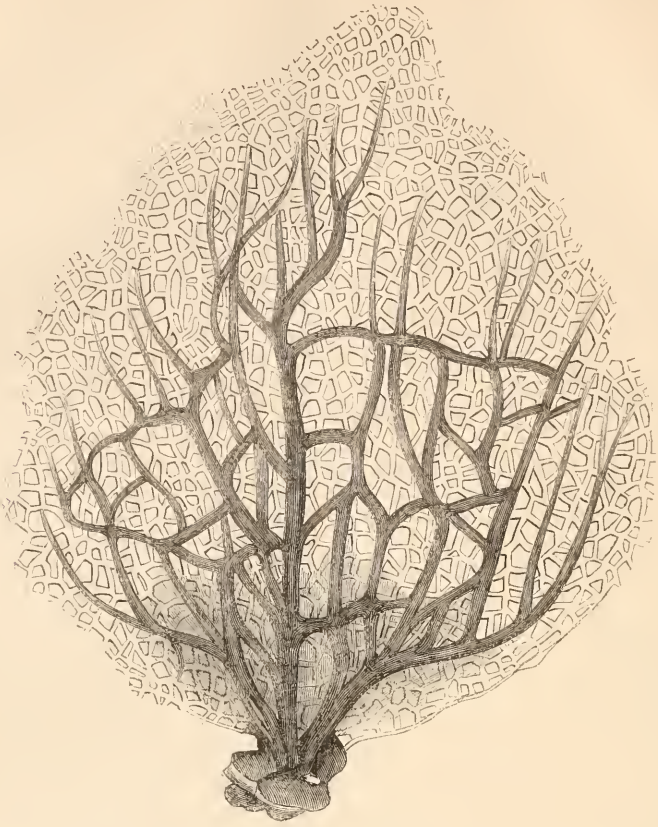


Fig. 25. The Common Sea-fan (*Gorgonia flabellum*), $\frac{1}{6}$ nat. size. After Johnston.



Fig. 26. *Gorgone verticillaire*, × 3.

the branching stems like the leaf-whorls of a verticillate plant, we part with the fan model altogether: this last looks so much like a *Sertularia* that but for the high authority of the French author we should have doubted if it really ought to be classified as a *Gorgonia* at all.

The Sea-fans are compound polypes, and to render the plan of their construction, and the nature of their being, intelligible to our junior readers, we must take a glance first of all at a solitary simple polype, and then pass on to the composite forms. Most of them are no doubt familiar with the commonest of all polypes, the "naked, free, solitary" *Hydra viridis*, and they have perhaps heard how it multiplies by "gemmation." From the body of the founder of the family little bud-like processes sprout, "which are soon observed to resemble the parent in character, possessing a digestive sac, mouth, and tentacula; for a long time their cavity is connected with that of the parent, but at last the communication is cut off by the closure of the canal of the footstalk, and the young polype quits its attachment and goes in quest of its own main-

tenance," like a creditable self-reliant young fellow, who scorns to be a burden on the old folks; but there are sometimes idle, improvident, shameless young polypes, who do not care to face the world and battle for themselves independently, and who, although they catch everything that comes in their way, still remain on the parent stem, communicating with the paternal canal, "bleeding the governor," no doubt they would say in their slangy way, if they could speak; and not content with thus loafing about at home, they even have the barefaced impudence to start buds and commence families; so that the poor old gentleman, "*Vir gregis ipse caper*," is made a grandpapa without being consulted, and burdened with the weight of three generations ("as many as nineteen young *Hydræ* have been thus connected with a single original 'stock'"); but although poor old Paterfamilias must find them a heavy drag, and they must try the strength of his *hydrorhiza* considerably, he has not got to feed them; each polype is furnished with a set of tentacula and a digestive sac, and fishes for itself. We regret to say that some most discreditable cases have been recorded, in which highly unbecoming scuffles have taken place for the possession of morsels of food, "nor is it an unusual thing to behold the young one and the old one struggling for and gorging the different ends of the same worm together." This squabbling is the more inexcusable, because it matters not in the end which of them swallows it, for the nutriment extracted from it, in whichever stomach digested, circulates through the intercommunicating canals for the benefit of the whole family, "as appears beyond dispute by the swelling of either when the other is fed."

Trembley observed the remarkable fact, that the digestive powers of the *Hydra* had no influence over the tissues of its own body, and he has given an instance of unmannerly greediness on the part of one, that is even more melancholy than that just related:—"On one occasion two *Hydræ* had both seized on the same prey, and were contending for the possession of it; one of them decided the contest by swallowing the subject of dispute and his rival into the bargain. Naturally supposing that the death of the swallowed polype would be the result of such an apparently tragical termination to the dispute, Trembley was not a little surprised to see the successful polype disgorge his antagonist safe and uninjured along with the egestamenta of the meal, and to all appearance none the worse for its temporary incarceration."

Sooner or later, however, the progeny are shaken off, and each polype becomes a free and separate individual. This mode of multiplying appears to prevail during the summer months only; there seems to be an analogy between these animal-buds, thrown off in the manner described, and the leaf-buds thrown off spontaneously by *Bryophyllum calcinum* and the bulbiferous lilies, which become perfect separate plants. There is another analogy between these lowly animals and the vegetable world: the *Hydra* may be propagated like a plant by "cuttings"; it is even stated by competent observers, who declare that they have themselves ascertained the fact by experiment, that if a *Hydra* be cut into a dozen pieces, each severed atom will in a short time throw out tentacula, and organize a stomach, and become a polype complete in all its parts, as surely as the "slip" or "cutting" from shrub, plant, or tree will strike root and grow into the "*alter ego*" of the stem from which it was taken. And there is still another analogy between this humble creature and "the fruit-tree yielding fruit after his kind, whose seed is in itself," for, in addition to the two modes of propagation already mentioned, it is endowed with a third: in the autumn the *Hydra* generates internal oviform gemmules, which appear as spherical lumps bulging out the skin, much in the form of polype-buds in their first stage. "The ovum here is seen to be surrounded by a polygonally-shagreened capsule, the ovum is still enclosed within another capsule furnished to it by the substance of the body-walls, in which, between the endoderm and ectoderm, the generative products are developed." These autumnal ova-buds (or seed-pods) are deciduous, and fall to the bottom of the water, as seeds fall to the earth, there probably to remain unchanged, until the warmth of the welcome spring calls them forth into life. The observation of these ova is so difficult as to be almost impossible: if they have been deposited in the course of nature in a pond, they get out of sight and out of reach, and are lost to us; if they have been thrown off in a tank, the unnatural conditions to which they are subject are almost sure to prove fatal to them. When this autumn laying is over, and the reproduction of the species has been thereby provided for, the life-task of the humble *Hydra* seems to have been wrought out; it has fulfilled its purpose, it has answered the end for which it was designed, and it sinks down and dies. As an organized being, as a *Hydra*, it dies, and is dead; yet, strange to say, the substance of which the body was made and fashioned does not die, it is not dissolved into its elements, it retains a life of its own, it exists as a gelatinous amœba-like living mass, perhaps intended to be used for the building up of some other and widely different animal body. Can it be possible that in this little lump of quivering jelly, lying at the bottom of a glass jar, we have a clue to the origin of that mysterious vitalized matter called *Bathybius*, which is said to be spread in infinite quantity over the vast surface of the ocean's bed? This fact concerning the body of the deceased *Hydra* was com-

municated to us by a professed naturalist of great practical experience, who has studied the subject carefully.



Fig. 27. *Hydræ viridis*, attached to the roots of duckweed. After Roesel.

The species of the marine *Hydrozoa* most nearly akin to the fresh-water *Hydra* is the *Tubularia indivisa* described by Sir John Dalyell in his "Remarkable Animals of Scotland."

From the brief sketch we have given of a "naked, free, solitary polype," we pass on to a compound form, in which the polypes are "protected by cells, developed according to regular patterns from a rooted and ramified horny tubular polypary." If we picture to ourselves a common *Hydra*, which, instead of casting off its polype-buds in the regular way, has retained them all, with all their buds, and their buds' buds for a dozen generations, all attached to and communicating with each other by their nutritive canals, we shall have before us a rude "archetype" of the compound *Hydrozoa*, *Hydroid*, *Hydriform*, or *Hydra-like* polypes.

"The seas which wash our own shores" (we quote from a lecture by Professor Owen) "are tenanted by numerous forms of minute polypi, having essentially the same simple organization as the Hydra, but which are protected from the dense briny element by an external horny integument. Now these likewise develop new polypes by gemmation; but as the external crust grows with the growth of the soft digestive sac, the young polype adheres to the body of the parent, and, by successive gemmations, a compound animal is produced. Yet the pattern according to which the new polypes and branches of polypes are developed is fixed and determinate in each species; and there consequently results a particular form of the whole compound animal or individual by which the species can be easily recognized. This compound hydriform polype-animal, or association of polypes, resembles a miniature tree, but consists essentially of a ramified tube of irritable animal matter (*m*, fig. 28), defended by an external, flexible, and frequently jointed horny skeleton (*a*); and is fed by the activity of the tentacula (*d*), and by the digestive powers of the alimentary sacs (*g*) of a hundred polypi, the common produce of which circulates through the tubular cavities for the benefit of the whole community.

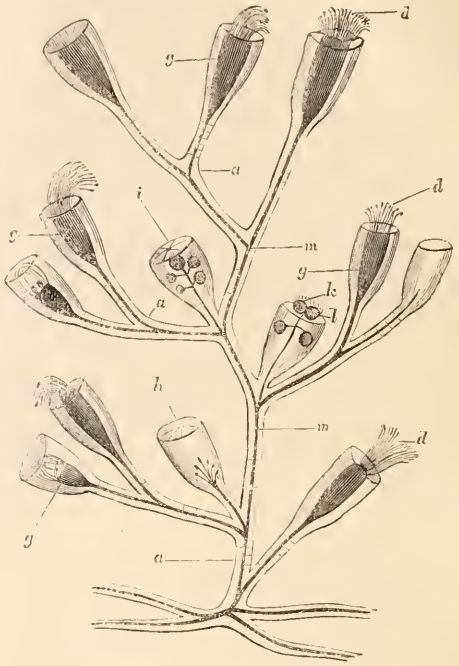


Fig. 28. Diagrammatic sketch of *Campanularia dichotoma*. After Owen.

"The peculiar external horny defence prevents the exercise of the gemmiparous faculty from effecting any other change than that of adding to the general size, and to the number of the prehensile mouths and digestive sacs, of the compound coralline. It is equally a bar to spontaneous fission; so that the ordinary phenomena of generation by ova or germ-masses are more conspicuous in the composite than in the simple *Hydrozoa*. At certain points of these ramified polypes, which points are constant in, and characteristic of, each species, there are developed little elegant vase-shaped or pod-shaped sacs, which are called the ovigerous vesicles, or 'ovicapsules.' These are sometimes appended to the branches, sometimes to the axillæ, as at *h*, *i*, *k*, fig. 28: they are at first soft, and have a still softer lining membrane, which is thicker and more condensed at the bottom of the vesicle: it is at this part that the ova or germs are developed (*h*), and for some time these are maintained in

connection with the vital tissue of the polype by a kind of umbilical cord (*k*, *l*). In all the compound *Hydrozoa*, the ovicapsules are deciduous, and having performed their functions in relation to the development of the new progeny, drop off like the seed-capsules of plants. This phenomenon afforded to the early botanists an additional argument in favour of the relation of these ramified and rooted animals to the vegetable kingdom." The modification in the growth of the coralline to form the ovicapsule, has been compared by Professor Edward Forbes with that "metamorphosis in flowering plants in which the floral bud is constituted through the contraction of the axis and the whorling of the individuals borne on that axis, and by their transformation into the several parts of the flower."—*Vide* "Annals of Natural History," vol. xiv., A.D. 1844.

From the *Hydra-like* compound polypes, with their horny *external* skeletons, we pass on to the class with *internal* skeletons, with which we are more immediately concerned, the compound *Anthozoa* (ἄνθος, a flower; ζῶον, an animal). "Fixed, compound polypes, with eight pinnate tentacles, retractile in cells of a fleshy substance, strengthened by calcareous spicula, and supported on a branched, calcareous, firm or flexible axis. Genera, *Gorgonia*, *Isis*, *Melitæa*."

We have seen how the poor naked solitary *Hydra* stands related to the infinite multitudes of all the class of compound creatures made more or less after the fundamental idea of which he is the humble expression; so, here also, as the starting-point of the myriads of the *Anthozoa* we see standing in analogous relation to them, a single, solitary animal-flower, the polype *Actinia*, the homely familiar Sea-anemone. The unclad *Hydra* shows no symptoms of the *sclerodermic* covering (σκληρὸς, hard, δέρμα, skin, or hide) which will invest the composite forms fashioned more or less after his image; nor does the soft Sea-anemone display any tendency to set up the chitinous, horny, or calcareous *sclerobasis* (σκληρὸς, hard, βάσις, foundation), which forms the axis, the mainstay and support of his compound representatives: indeed, the thin base-disc or foot of the common *actinia* is as fatally vulnerable as the heel of Achilles, while the other parts of his body may be cut or torn with comparative impunity.

It would be beyond both the object we have in view, and the limits of our space, to go into minute details of the difference in the modes of growth and life of the polypidoms of the *Hydrozoa* and the *Anthozoa*, but we hope that no one will run away with the impression that we wish to convey the idea that a *Sertularia* is only a branching *Hydra* with a horny case; and that *Gorgonia*, and the rest of the *Anthozoa*, with their skeletons inside their cœnosarc (κοινὸς, shared in common, σὰρξ, flesh) instead of outside, are only *Hydrozoa* turned outside in: we can only afford to speak in broad general terms; for exact and full details the student must refer to such works as Johnston's "British Zoophytes," Hincks's "Hydroid Zoophytes," Couch's "Fauna of Cornwall," Owen's "Anatomy of the Invertebrata," and the writings of Van Beneden, Lister, Dalyell, Milne-Edwardes, and others. Lister, in "Philosophical Transactions, 1834" (quoted by Rymer Jones, "General Structure of the Animal Kingdom"), gives a very full account (with illustrations) of the development of the *Hydrozoa*.

To many people these books are almost as inaccessible as the "Rig Veda" of the Brahmans, or the "Tao-Te-King" of the Chinese sage "Lao-tse"; yet they may be dear lovers of Nature, yearning with earnest longing to know something about the miniature sea-firs and sea-willows, which the ocean throws up in millions at their feet; so, for their benefit, we here insert a long extract from Johnston, on the growth of the Polypidom of the compound hydriform polypes.

"The ripe ovule or bud discharged from its matrix, settles, and fixes itself to the site of its future existence by minute fibres which pullulate from the under side, while from the opposite pole a papillary cone shoots up to a height determined by the law which regulates the peculiar habit of the species. The upward growth is then arrested, and the apex becomes enlarged and bulbous. The structure of this rudimentary shoot is at first apparently homogeneous, but very shortly the separation between the sheath and the interior pulp begins to be defined, and is made hourly more apparent by the pulp retreating inwards, becoming darker and more concentrated. That portion of it in the bulbous top of the shoot goes on to further condensation and development; and as it enlarges, so in proportion does the horny cuticle that covers it expand apace until it has gradually evolved into one or two cells, which are still closed on all sides. The dark body of the polype is apparent through the thin and transparent parietes, and from its superior disk there are now to be seen some minute tubercles or knobs protruding, which becoming insensibly but steadily more elongated, constitute the tentacula of the polype, now nearly ready for a more active life. By an extension of development, or by a process of absorption not well understood, the top of the cell is at length opened, the polype displays its organs abroad, and begins the capture of its prey; for, unlike higher organisms, it is at this the period of its birth as large and as perfect as it ever is at any subsequent period, the walls of the cell having become indurated and unyielding, and setting a limit to any further increase in bulk. The growth being thus hindered in that direction,

the pulp, incessantly increased by new supplies of nutriment from the polype, is constrained and forced into its original direction, so that the extremities of the tube, which have remained soft and pliant, are pushed onwards, the downward shoot becoming a root-like fibre, and the upper continuing the polypidom, and swelling out as before at stated intervals, into cells for the development of other polypes."

The material of the polypidom, or hard sheath protecting the soft pulpy cœnosarc, appears to be analogous to horn or condensed albumen. There has been much disputing about the relations subsisting between the sheath, the cœnosarc, and the polypes, as to which produces the other, and whether the three are more or less independent of each other. The following summary is given: "The growth of the two parts (pulp and polypidom) is cœtaneous, for although the expansion of the membrane apparently precedes that of the pulp, it is nevertheless dependent on the growth of the latter for its expansion, and regulated by it: there is but one life and one plan of development in the whole mass, and this depends, not on the polypi, which are but secondary and often deciduous parts, but on the general fleshy substance of the body."

In the *Gorgoniadæ*, instead of a branching cœnosarc (*m*, fig. 28), and individual polypes connected therewith by pedicels, the whole being encased in a horny sheath, we find on the outside a semi-cartilaginous vitalized mass, the cœnosarc (*a*, fig. 29) investing a central axis, the sclerobasis, of a horny material (*b*, fig. 29), which gives stiffness and support to the whole structure. The eight-armed polypes (*c*) are neither lodged in nor attached to this internal polypidom, but occupy cavities in the external cœnosarc, communicating with the latter and with each other only by means of the canals which run through the whole mass for the purposes of the general nutrition. These canals appear like dots (*d*, fig. 29).



Fig. 29. Transverse section of *Gorgonia verrucosa*, × 5.

We have seen how the reproduction of the species is accomplished in the *Hydra* and in the compound *Hydrozoa;* but in these *Corallaria* we have no multiplication by fission, by deciduous buds, or by medusiform larvæ escaping from external vase-shaped "ovi-capsules" like seed-pods. The depths of ocean have hidden from our inquiring eyes the secrets of the babyhood of the young *Gorgonia*. We believe that he originates from an egg formed somewhere on the inner surface of the lining of the canal underneath the abdominal cavity of the polype, somewhat after the ovarian plan of the Sea-anemone, the Gorgonia-polypes being, in a general sense, *actiniform* —the *Zoanthus*, with its creeping, root-like processes, reminding us of the mycelium of the fungi, being apparently the connecting link between the solitary *Actinia* and these compound forms. But the transformation of this egg into the sprouting zoophyte has not been observed in the same satisfactory and conclusive manner as the birth and growth of the *Hydrozoon*, the story of which (borrowed from Johnston) we have just related; but there seems to be every reason to believe that a very close resemblance exists between the first stages of the nascent *Hydrozoon* and of the *Gorgonia*.

Some of the *Gorgoniæ* throw out branches, which remain separate—*G. pinnata* (fig. 24), for example. In others, such as *G. flabellum*, the twigs inosculate or anastomose, forming a network reminding us of a skeleton leaf. In fig. 30 we show a portion of the typical Sea-fan, magnified sufficiently to exhibit the circular pits in the cœnosarc occupied by the polypes.

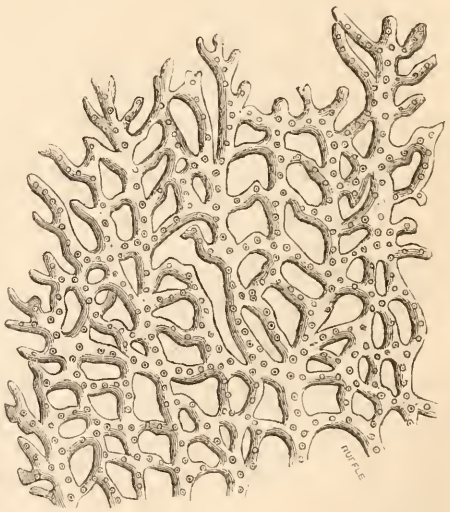


Fig. 30. Small portion of *Gorgonia flabellum*, × 5.

We also give a figure (31) of *Isis hippuris*, in which (*a*) shows a portion of a branch covered with the cœnosarc and studded with polypes. Below this portion, the investments have been removed, to display the axis, composed of alternate joints of (*b*) horny, and (*c*) calcareous matter. The main

branch is shown in vertical section, with (*e*) a polype in its cell, and (*d*) an empty cell.

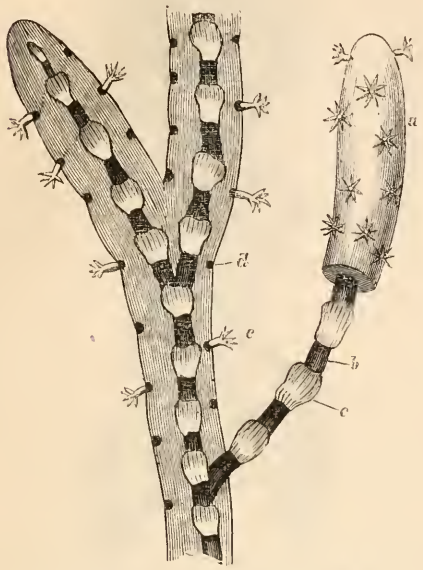


Fig. 31. *Isis hippuris*, × 5, vertical section.

"The structure of the axis of the *Gorgoniadæ*," says Quekett, in his "Lectures on Histology," "has been the subject of much controversy. Many authorities consider it to be inorganic. There can, however, be no doubt that, although the polypes do not form the axis, they are mainly concerned in preserving its vitality, and, as long as the polypes are alive, changes, both in the interior and on the exterior of the axis, are continually going on;" and he mentions a specimen of *Gorgonia flabellum*, in the museum of the Royal College of Surgeons, in which Nature has repaired an extensive fracture, "nearly across the centre."

In some species the axis is composed of concentric laminæ of brown horn; others, as *G. spiralis* (fig. 33), show, not only concentric lamiuæ of horn, but a number of large radiating lines, which look like tubes, but are, in reality, connected with the spines seen on the surface.

In *G. petechialis* (fig. 32) it is chiefly composed of spicula, so arranged as to leave a number of large canals, which run from one end of the axis to the other; and the spicula near the surface are much larger than those in the centre.

In *Melitæa ochracea*, which is jointed like *Isis hippuris*, the horny matter is so small in quantity as only to suffice to hold together the numerous spicula of which the calcareous part of the axis is composed.

In *Corallium rubrum*, the common red coral of commerce, the axis is very dense, and capable of taking a high polish; but there is abundant evidence to prove that, even solid as it is, it was originally composed of spicula.

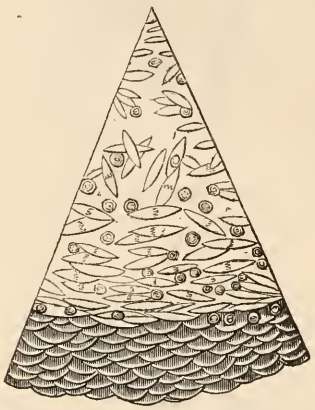


Fig. 32. Transverse section of a segment of axis of *Gorgonia petechialis*, × 45. After Quekett.

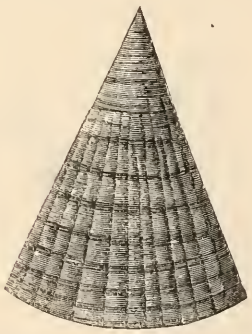


Fig. 33. Transverse section of a segment of axis of *Gorgonia spiralis*, × 45. After Quekett.

The "spicules" of our cabinets are chiefly obtained from the dried crust or cœnosarc, although they abound in all parts of the zoophyte, and when carefully selected and skilfully mounted they are beautiful objects for the microscope: the forms are so distinct from each other that it has been thought that by a careful examination a classification of varieties may be some day based upon them. The figures 34 to 42 are of "Gorgonia spicules," drawn under the microscope (× 75) from a superb set prepared by Mr. Cole, of St. Domingo Vale, Everton, Liverpool, which will shortly find a suitable resting-place amongst the treasures of the Quekett Microscopical Club.



Fig. 34. Spicules from *Gorgonia flabellum*, × 75.



Fig. 35. Spicules from *Gorgonia verrucosa*, × 75.



Fig. 36. Spicules from *Riphidogorgia flabellum*, × 75.



Fig. 37. Spicules from *Acanthogorgia Johnsoni*, × 75.



Fig. 38. Spicules from *Leptogorgi* × 75.

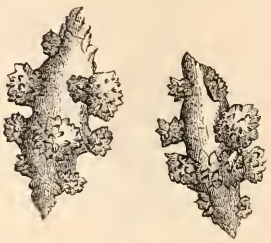


Fig. 39. Spicules from *Melithæa coccinea*, × 75.

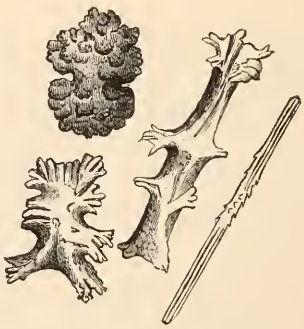


Fig. 40. Spicules from *Homophyton githago*, × 75.



Fig. 41. Spicules from *Eunicea*, × 7



Fig. 42. Spicules from *Primnoa verticulosa*, × 75.

Mr. Cole gives the following brief and simple receipt for preparing and mounting these spicules: —"Boil in strong *liquor potassæ* for three or four minutes, and then wash repeatedly in distilled water until the latter passes off quite colourless; then mount in Canada balsam: if the specimens are to be mounted dry for the paraboloid, make a cell of the proper depth, coat the inside of the cell with thin gum-water; when this is dry, breathe on it to moisten its surface, then place your spicules in the cell, turn the slip over, and tap the back so as to knock out any that may be loose; put on your thin cover, and all is done but asphalting the cell and labelling the slide."

"It might not be difficult," says Dr. Johnston, "but it is beyond my province, to trace the gradual increase and consolidation of these spicula through many intermediate species to the horny flexible axis of the *Gorgonia*, where it has become such an efficient support to the whole soft envelope as to claim not improperly the name of its skeleton; thence to the stony axis of the coral, and having there reached its maximum of development, I might on the other hand have marked its progress towards degeneration until it became again only a partial support, such as we find it in the naked middle portion of the *Pennatulidæ*, more especially in some of the foreign and less typical species of that family."

The following is a list of the British *Gorgoniadæ* from the work of the author last mentioned.

1. *Gorgonia verrucosa*, somewhat fan-shaped, much and irregularly branched, the branches cylindrical, flexuous, barked when dry with a white warted crust; segments of the cells unequal, obtuse; habitat deep water; abundant along the whole of the south coast.

2. *Gorgonia pinnata*, when living, a little thicker than sewing cotton, of a cream-white colour, the polypes white with dull granular pinnated tentacles; found in thirty fathoms water in the Isle of Skye.

3. *Gorgonia placomus*—has been mistaken for a coralline—of a reddish-brown colour, has its branches disposed in a dichotomous order and flattish form; they bend irregularly towards one another, but rarely unite; very rare, on south coast.

4. *Gorgonia anceps*, the Sea-willow—Keratophyton dichotomum; caule et ramulis leviter compressis; of a yellow-white when fresh, drying of a deep violet; found only in deep water, and very rare.

5. *Gorgonia flabellum*, the common Sea-fan, has been admitted into the British fauna on very insufficient evidence.

The *Primnoa* differs from the Gorgonia in having a hard stony axis, approaching to that of the true corals.

Primnoa lepadifera, eighteen inches high and as thick as a swan-quill; found in Shetland, Norway, Lapland, and the White Sea; crust whitish, covered with pear-shaped polype-cells.

Isis hippuris, owes its name to the resemblance it bears to the *Equisetæ*, mares-tails; is found on the east coast of Scotland and Orkney Islands.



Fig. 43. Coral polypes, × 25 ("*épanouis à des degrés divers*"). After Lacaze Duthiers.

The *Gorgoniadæ* were not generally believed to be luminous, but the researches of the men of science who conducted the deep-sea exploration in H.M.S. *Porcupine*, in 1869, show that those dredged up from great depths, 557 to 584 fathoms, were brilliantly phosphorescent: "The *Pennatulæ*, the *Virgulariæ*, and the *Gorgoniæ* shone with a lambent white light, so bright that it showed quite dis-

tinctly the hour on a watch." "The question of the amount and the kind of light in these abysses was constantly before us. That there *is* light there can be no doubt. The eyes in many species of all classes were well developed; in some, very remarkably so. It is scarcely possible that any appreciable quantity of the sun's light can penetrate beyond two hundred fathoms at most." "It seemed to us probable that the abyssal regions might depend for their light solely upon the phosphorescence of their inhabitants." Here is a new thought dragged up for us, *de profundis*, from more than a thousand feet beneath the surface of the sea, to fill us with wonder and astonishment.

The wild gales that sweep over our coasts in this boisterous month of March will disturb even the bed of the ocean; and the lashing waves, for ever battling with our tall cliffs, and grinding, tearing, and transporting our shingle-beaches and sands, will throw up many strangers at our feet—creatures never seen in calm weather, torn up from below, and carried, perhaps, hundreds of miles by ocean currents; perhaps, a *Gorgonia flabellum* may be brought to us by the "Gulf-stream": tons of zoophytes of all kinds will be left stranded by the spring tides; and who knows but that, amongst the innumerable forms of life brought home to us by the storms of the vernal equinox, we may not pick up a few living specimens of the asteroid polypes about which we have been gossiping, the *Gorgoniæ*, the creatures furnishing the "spicules" of our microscopic slides, the luminous animal-plants of the mighty deep, the common Sea-fans.

Bury Cross, Gosport.

MY KESTREL.

OF all my numerous feathered favourites, none excite my admiration so much as the Falcons, with their lofty flights and long graceful swoops. Often have I stood on the green hill-side watching with delight one sailing away through the clear air, steadily diminishing in size till it appears but a mere speck against the sky, till at last sight can follow no farther. Unfortunately for the naturalist, though, perhaps, fortunately for farmers and game-keepers, many of our beautiful raptores are becoming great rarities with us. As to the larger species, it is not surprising that as cultivation and civilization increase, they are driven farther and farther away from the haunts of man, to seek their prey in wilder regions.

Should one make its appearance now, it is pursued by every one possessed of a gun, and even then, if fortunate enough to escape its numerous foes, it is only by the exercise of such vigilance, that the saying "as wild as a hawk" only expresses a fair amount of caution on its part. Of course it is to be expected that the agriculturist would be in arms against the invader to save his chickens and ducklings from slaughter, and certainly he has a fair excuse for waging deadly war against the Kites and Sparrow-hawks which disturb his farmyard. But if he would be content with the destruction of those birds alone, and leave the rest in peace, it would be quite satisfactory; but with a sweeping denunciation he includes the whole race of raptores among the "vermin" he has some cause to hate, and thus not only does the greatest injustice to my little friend the Kestrel, but in fact declares war against his very best ally. And after all it is chiefly through carelessness or obstinacy that he persists in his folly.

No one would mistake the Kestrel hovering on the wing, and watching for his prey beneath him, for the Sparrow-hawk or Kite sailing and swooping in large circles round the farmyard, looking out for a chicken or small bird. The effect of the presence of the two species is also very different. On the approach of the Sparrow-hawk, the whole yard is in an ecstasy of fear and anger, the smaller birds hiding themselves in a twinkling, and the larger uttering warning notes, and preparing for the foe. The Kestrel, on the other hand, passes without notice: small birds, indeed, do now and then assemble in flocks, and chirp defiance; and not long ago I saw one mobbed by a large flock of starlings.

If only farmers and others could be brought to see the injury they do themselves for every Kestrel's head they nail to their barn-doors, we might hope that we should see them more frequently than we do; for although they are oftener met with than any other raptores, there is reason to fear their numbers are slowly diminishing.

But, notwithstanding his numerous enemies, the Kestrel still keeps close to man's habitation, knowing that his chief prey is found there rather than in less-cultivated regions. Probably on every occasion he hovers over the farmer's grass-land, unless driven off, he swoops down on some hapless field-mouse creeping through the close-cut grass; and knowing from experience how many mice each bird can devour *per diem*, the estimated number of victims demolished *per annum* must, I am convinced, amount to some thousands. These, there is no question, are his staple food; but when they fail, small birds, lizards, frogs, and coleoptera are very acceptable; and though gamekeepers are apt to complain that young game suffers at his hands, I am inclined to believe that the amount of chickens, young partridges, and pheasants that are consumed by them may be estimated at nil.

But it is as a domesticated pet that I would gossip of the Kestrel, rather than as we find him at large. In a state of captivity, I have had abundant opportunities of observing his instincts and idio-

syncrasies, and find how closely does he resemble his raptorial brethren in his leading characteristics.

I obtained my pet in June last, and discovered her sitting disconsolately with her brothers and sisters in an old cage. She was not more than half-fledged, but the down in which she was encased made up for her want of clothing. In less than a month her plumage became superb, and has continued so ever since, with the exception of the tail, which, being too long for walking purposes, dragged on the ground in a sad state of dirt, and ultimately had to be docked for appearance-sake. During the summer and autumn she resided in the garden, and with her wing cut, was allowed her liberty, while any of the family was at hand to keep watch over her. Being very tame, I had abundant opportunities of studying her peculiarities, and I have seldom had a more entertaining or versatile companion. Her diet consists of ordinary "cat's meat," relieved by raw meat, mice, birds, and insects. Mice are undoubtedly her favourite food, and would disappear with marvellous celerity, without the slightest vestige being left. Small birds she rather likes, but evidently it is too much trouble to pick them properly, as they are generally only half-deplumed; but the first operation was always to pick out and devour their eyes. In the summer she bathed regularly once a day, and spent the morning preening and dressing her feathers. Insects of all sizes and kinds were summarily devoured, and I have more than once captured wingless females and imperfectly-formed moths unable to fly, by finding her dancing round them in their endeavours to escape, and with a gentle nibble giving them a hint to run faster; and when the poor insect was too maimed or exhausted to crawl farther, the sport being ended, they were eaten without further delay. Indeed, she appears quite indignant with spiders, because, instead of hurrying off, they lie down and curl themselves up. It is curious to observe how important a part the talons play in the economy of this bird. Everything is taken up and examined, and, if possible, carried off. The bill is used only for tearing her food; and with the notch in the upper mandible which is characteristic of the true Falcons, she can, with a scissor-like action, cut through very hard substances. The peculiar position of the legs, which are placed very forward in all the raptores, is very noticeable, evidently giving the bird a greater amount of leverage to assist her in tearing her meat, which she holds in her talons and pulls in pieces by main force. But the talons are used, to my surprise, almost as much as a parrot's. Even in the garden, where there is nothing edible, she amuses herself with pouncing on a stone or piece of brick, and hobbling off with it, considering it as a sort of prey; for if it be taken from her, a terrible noise ensues. Her chief weakness is her temper, which, when ruffled, is none of the sweetest; and as fear does not enter into her composition, it takes no little trouble to overcome her. Screaming at the top of a very shrill voice, she charges at my hands, clawing and scratching like a game-cock, and, as may be imagined, inflicting most unpleasant scars. Indeed, it is only until she has been upset, rolled over, and buffeted for some little while, that she thinks discretion the better part of valour, and runs away. Her great antipathy is a cat; and strange pussies which have endeavoured to secure her as a prize, by stalking up quietly for the purpose, are met with a very warm reception, and generally turn tail and run off in astonishment. My own cat can hardly eat anything in her sight without having to flee to avoid bites and scratches; but by degrees they are becoming more amicable.

During the last summer weather she would lie down in the grass, and, spreading her wings, bask in the fervent rays of the sun, and in cold weather her weakness is to sit on the kitchen fender and enjoy the warmth in the same manner. I was very much entertained at some sparrows which flocked round her while engaged in sunning herself. Neither of them cared for the other, till the sparrows came so close as to annoy her; so she got up and ran after them to drive them off; but, to my surprise, they paid not the slightest notice, but hopped away as unconcernedly as possible, taking care to keep just out of her reach. I can only account for such behaviour by their being London sparrows.

She seems to coincide entirely with the description given by different authors, except that while Wood, Macgillivray, Mudie, and others describe the *iris* as yellow, in her it is a dark brown, so dark as to appear black unless seen in a strong light. The bill is of a light grey at the base, growing darker at the tip, and grows fast, as she fractured it at the tip some time ago; but now it has resumed its usual appearance, without a trace of the accident. It is considerably larger than in the wild specimens I have seen, probably because in captivity there is not so much occasion for its use or so much opportunity of keeping it down.

In conclusion I would recommend those who have a weakness for taming birds to try a kestrel, as I feel confident they will find it a most entertaining and pleasant pet. A. G. H.

"Birds and Flowers," by Mary Howitt, illustrated by Giacomelli, is a beautiful gift-book, published by Nelson & Sons. The poetry is much of it familiar as household words; but the exquisite little woodcuts and the style of getting up far surpass the previous edition. It is just the book for a true lover of nature as well as of art. It contains treasures for young or old, suitable for all times and seasons; and we commend it to our readers as just the book that will please them.

MICROSCOPIC OBJECTS. *

IT is always a pleasant task to bestow praise, it is seldom a welcome one to find fault. Fidelity is a virtue which is expected when judgment is solicited, and if the verdict is not agreeable, the evidence, and not the judge, is to blame, if he is called upon to decide according to evidence, and does so faithfully. The book before us comes with a good prestige in the name at the bottom of the title-page; there was room enough for a good book on the subject, and one big enough for the purpose has been produced. Acquainted, as we are, with the splendid microscopical plates of the brothers Tulasne, and in our own country with the work of Tuffen West, it was not too much to hope that a new work on microscopical objects would possess some of the artistic merits of these men. Alas! that we should be so grievously disappointed. This volume contains just two hundred figures of microscopical objects, not always selected with the most judicious care, seldom executed with skill. Fig. 138 is said to be the "Meadow Blue Butterfly." (*Polyommatus Alexis*), natural size. It is fortunate that the letter-press is opposite to the figure, or the lepidopterist would fail to recognize it, although it is of the "natural size." We will not stay to inquire why this and some other figures are inserted of the "natural size"; had they been excellent of their kind, we would have forgiven their intrusion. But what can we say of some that are *not* of the "natural size," except that they are very unnatural? Let our readers compare for themselves the "foot of a fly," fig. 155, with the plates of the feet of insects by Tuffen West, in the "Linnean Transactions," or the well-known "tongue of blow-fly," fig. 151, even with our own woodcut in an early volume of this journal, and pronounce a candid opinion. We venture to predict that it will not be in Mr. Martin's favour. The Anopleuria (figs. 163-165) should be compared with the figures in Denny's Monograph, both for fidelity and execution; and as for the poor spider in fig. 167, alas! poor fellow, we pity even a spider so badly caricatured. Some of the figures are fairly drawn, but, on the whole, they are the coarsest and most unsatisfactory for delicate microscopical objects that we remember to have seen. If we gave way to a captious spirit, we might take exception even to the letter-press, but will rest content with expressing our very great disappointment, and recording our sympathy with the author for having been persuaded to venture so far beyond his powers, neglectful of the consequences of "vaulting ambition that o'erleaps itself." May his next venture be more restricted and more successful.

* "Microscopic Objects. Figured and described by John H. Martin, Honorary Secretary to the Maidstone and Mid-Kent Natural History Society. London: Van Voorst."

THE HERMIT CRAB.

IN order to observe some of the habits of the Hermit Crab, six of various sizes were placed in a basin of salt-water. At first they appeared dissatisfied with their artificial abode, but they soon gained courage to peep from their shells, and shortly afterwards began to run about and show strong symptoms of a very pugnacious disposition. It so happened that one was considerably too large for his shell, for he could not, when disturbed, retreat entirely inside, as the others. An empty shell of larger dimensions was put into the basin, when he immediately made for it, evidently with the intention of availing himself of a change. At first he moved it, to see if it was empty; then he examined it all over, thrust his nipper-claws and body as far into it as possible, to ascertain its character inside, and when he had satisfied himself on all points, he withdrew from his old shell, and by a rapid scientific movement introduced himself into the new. He took care, however, to retain firm possession of the old shell till he had well tried and felt sure that he found no fault with the new one; satisfied that it fitted him, he scampered off, leaving his old house to be taken possession of by a fellow-crab of smaller dimensions, which very soon was the case; but it so happened two crabs of much the same size took a fancy to the empty shell; the elder, however, beat the younger, and secured the prize. After going through the same formality of examination as the previous, and apparently satisfied with the shell, yet he would not venture his body out of his castle whilst his antagonist was at hand. All the other crabs were therefore removed, and he was left in the basin by himself, in quiet possession of the empty shell. When alone, he soon, by the same scientific movement, thrust his body into his companion's cast-off shell; but, from some cause or another, he was not satisfied with the change, for he very soon left his new for his old abode. After a little time, however, he re-examined the empty shell, and again twisted himself into it; and, before he had time to leave his new shell, the old one was removed, when he immediately began running about, evidently looking for it. After a little time his old shell was put into the basin, when he instantly ran to it, and by a surprisingly rapid movement, once more took possession of his old shell; and though left for some time in the basin with the larger shell, he could not be induced again to take possession of it. The lively and eccentric movements of the crabs afforded much amusement to a group of young folks, who evinced their pleasure by repeated and loud bursts of merriment. The noise, however, seemed to have no effect upon the crabs; but the slightest movement of any of the spectators was observed, and caused them to retreat for protection within their shells.—*A. E. Murray.*

ZOOLOGY.

Sea Urchins.—The common *Echinus sphæra* is eaten in France, Spain, and Italy. I do not know in what part or portions of this kingdom it is made an article of food; but if "W. S., Belfast," will put the question to Mr. Frank Buckland through the medium of *Land and Water*, should he not obtain a reply to his question in Science-Gossip, I have little doubt but what that gentleman will be able to inform him.—I was told by a friend who tasted sea urchins abroad, that they were boiled in sea-water, picked out of the shell when cold, and eaten with oil and vinegar; also stewed like oysters, and plain boiled and eaten like eggs.—*H. E. Watney.*

The Locomotion of Crass.—Neither do I doubt "E. J. T." on this point, when he says he was "conquered by a crass," who disappeared in the sand; for I took several specimens on the shore at Llandudno a week ago, just below the lesser Ormes-head in a similar way; but I was alluding, in the little article "E. J. T." notices, to the *very slow* manner in which crass change their quarters from one stone to another in an aquarium. I have one now which I carefully watched effecting his removal, and I feel sure I was quite correct in saying crass do move most slowly under such circumstances. Several crass which my boy succeeded in digging up out of the sand were firmly attached to a small stone, and the way he proceeded was to dig round the crass, at a little distance off, and suddenly fish the stone up, crass and all, out of the sand, by inserting the point of a stick under it. Now if the crass that disappeared were fixed to stones, how did they escape? Could they push the stone down? This seems almost impossible, as does the idea that if their base were attached to a stone at any very great depth below the surface of the sand, they could so elongate themselves as to come up to the top when they wanted to bask in the rays of the sun. I have never seen this power which crass possess of disappearing in the sand on being disturbed noticed in any work, but, as I before observed, "E. J. T." is quite right in what he has stated, and so am I in asserting they move *very* slowly from one stone to another.—*H. E. Watney.*

The Blue Tit.—The writer of the interesting article on Titmice, last month, tells us that the Blue Tit "rarely [quarrels with] any bird." In Mudie's "British Birds" we are informed that "when opportunity favours, it kills other birds by punching them on the head." Which of these assertions is the right one? My observation gives a decided verdict for the former.—*H. C. Sargent.*

Natural Instinct.—A year or two ago some partridges were hatched under a bantam hen at Mobberley Hall, Cheshire. After following the hen for some time, an old partridge made its appearance, and enticed the young ones away from the hen. They followed her readily, understanding her call. The old partridge was probably one that had been reared by the gamekeeper the year before, and had become partially tame; for after thus asserting her maternal rights, and taking possession of the young ones, she remained about the hall and gardens with her brood.—*Robert Holland.*

The Prawn.—How crabs and other crustaceans manage to cast their shells is another of the wonderful occurrences of nature. It is all very easy to talk of the "softening of the muscles," and so forth; but how can all the softening of the muscles enable the creature to withdraw the substantial flesh at the thick end of its forcep claws through the narrow openings at the different joints? However, it *is* done, but *how* is the question. With the crab it must be a work of time, but with the prawn it is a matter of a moment, and which I lately had the satisfaction of witnessing. When the prawn is about to cast its shell, the creature is then less active or lively; it is constantly fidgeting with its legs, bending its body, and evidently altogether feeling very uneasy. Probably, during these operations it contrives to make the opening at the back of the shell through which it afterwards escapes. At all events, its exit is only the work of a moment, for, bending its body till its head and tail meet, it gives one sudden spring, and emerges clean and clear out of its old shell, leaving it, even to the extreme end of its delicate antennæ, as sound and perfect as if it were still occupied by the living animal. Though my prawns have often cast their shells, all of which have been most wonderfully perfect, even to the minutest point, yet I have never met with one but what has been deficient of its eye-coverings. —*A. E. Murray.*

Transformation of a Hairy Caterpillar.—A hairy caterpillar, which had been kept in a box and fed upon leaves, began to spin its web on the 12th June. In spinning it managed, either intentionally or by accident, to introduce a considerable quantity of the hairs from its body into the web, so that the web and hairs appeared pretty much in equal proportions. On the morning of the 19th the chrysalis began to make its appearance, and in the course of half an hour it contrived to free itself from the now useless hairy skin by gradually working the skin off towards the tail end. When the chrysalis first freed itself it was of a light yellow colour, but by the evening of the same day it had assumed a dark, reddish-brown, glossy appearance, and by next morning it was perfectly black. On the 16th July the moth broke the chrysalis, so that the transformation only occupied twenty-seven days.—*A. E. Murray.*

Climbing Rats.—I can fully bear testimony to the power, as well as the inclination of rats for climbing, as spoken of by one of your correspondents in Science-Gossip for last month. In my father's garden we had a Ribston-pippin apple-tree, and the fruit, remarkably large and fine-flavoured, disappeared one year in a very remarkable manner. We children having been told not to meddle with that particular tree, were reproved more than once, but in spite of the scolding the apples continued to lessen, and the guilty child could not be discovered. One day I was walking in the garden, and happened to look with more than usual attention at a very bushy rose-tree growing very near the wall, when I perceived a heap of something behind it that I could not well make out, and on turning back the branches, to my astonishment and delight, there was a large quantity of Ribston-pippins, some quite fresh-gathered, and others showing unmistakable marks what kind of teeth had been employed on them. I need scarcely say that I ran to fetch my father to look at my discovery, who was both amused and surprised to find who had been the apple-stealer.—*H. E. Wilkinson, Penge.*

Skylarks in New Zealand.—In a letter from my brother in New Zealand, he says there are great quantities of skylarks about here (Blenheim): we hear them all day long. It is pleasing to find that some of our favourite birds are making themselves at home in the colonies. I quite agree with Mr. Spicer and Mr. Ullyett in their remarks in recent numbers of Science-Gossip respecting the introduction of foreign birds, insects, &c., to localities suitable for them in this country. It would in a measure compensate for the loss of some of our own fauna, which, from cultivation of the land, &c., are now very rare, or perhaps extinct.—*H. Budge.*

The Tsetse (*Glossina morsitans*).—Innumerable flies appeared, including the Tsetse, and in a few weeks the donkeys had no hair left either on their ears or legs; they drooped and died one by one. It was in vain that I erected sheds and lighted fires: nothing would protect them from the flies. The moment the fires were lit, the animals would rush wildly into the smoke, from which nothing would drive them, and in the clouds of imaginary protection they would remain all day, refusing food.—*Sir S. Baker, "Exploration of the Nile Sources."*

Bats out in Winter.—It may interest some of the readers of Science-Gossip to know that I saw a bat on the wing, in the middle of the day, on Sunday, February 5th, of this year. The day was comparatively mild. The animal seemed full of vigour, and was flitting backwards and forwards over the garden, as though hawking for insects. The same animal or a similar one was seen the next morning under like circumstances by some members of my family.—*W. W. Spicer, Potterne, Wilts.*

Effects of Cultivation on the Insect World.—There is nothing but dusty roads and paddy-fields for miles around, producing no insects or birds worth collecting. It is really astonishing, and will be almost incredible to many persons at home, that a tropical country when cultivated should produce ten times as many species of beetles as can be found here (Lombok, a member of the Sunda group of islands); and even our common English butterflies are finer and more numerous than those of Ampanam in the present dry season. A walk of several hours with my net will produce perhaps two or three species of *Chrysomela* and *Coccinella* and a *Cicindela*, and two or three *Hemiptera* and flies; and every day the same species will occur.—*Wallace, "Zoologist."*

Abundance of Insect Life in the Tropics.—When we consider that an ardent and most indefatigable entomologist after spending eleven years in one region, the valley of the Amazons, devoting his whole time and energy to searching after butterflies, yet finds new species turning up in almost unabated profusion, and that every little district visited, though but a few miles distant from the last, has its own peculiar though allied kinds—we may form some idea of the vast variety and abundance of unknown insects which the almost boundless forests of South America have yet to yield to scientific enterprise!—*P. H. Gosse, "Romance of Natural History."*

Great Bustard.—As this bird, once so common on Salisbury Plain, is never seen there now but as a rare visitor, it is worthy of record that in January last three were seen on Maddington Manor Farm, one of which was shot, and has been presented to the Salisbury South Wilts Museum. It is a female, weight only 7¼ pounds, and measures 31 inches from the beak to the end of the tail, and 62 inches from tip to tip of the wings. It is reported that four bustards have been shot recently in Cornwall, and others seen in Dorsetshire. Again, in this month (February), two more were seen at Berwick St. James, Wilts, one of which was shot with a bullet. It is a cock bird, length 40 inches, from beak to end of tail; spread of wing from tip to tip, 7 feet; weight about 15 pounds. This account is taken from *The Salisbury Journal*, 1871.—*W. S.*

[*The Zoologist* for February contains some interesting correspondence on the recent occurrence of the Bustard in this country, which our readers should consult.—Ed. S.-G.]

Pomarine Skua.—Some readers of Science-Gossip would be interested to know that a Pomarine Skua was shot at Harwich last week; it was an adult bird, and had a beautiful plumage. It is many years since one was killed about here.—*James Mash, jun.*

BOTANY.

Michaelmas Daisy.—The common Michaelmas Daisy of the gardens is very plentiful in a hedge on the roadside between the village of Woolton and Speke station, near Liverpool. Of course it is an introduction, having probably been brought to the field with manure; but it bids fair to become quite naturalized.—*Robert Holland.*

Home-grown Currants. — The plant of the Currant-grape, imported two years ago from Cadiz, has, for the first time, produced some fine bunches of fruit of a singularly graceful and pretty form. Should we succeed in drying them, they will probably be the first home-grown and home-cured sample of "pudding currants" yet produced in England, although large quantities are annually imported from the Levant: this is another product almost wholly confined to one district, the cultivation of which might be extended with advantage. —*Royal Botanic Society, Extract from Secretary's Report*, 1870.

Big Vines at the South.—The "Walter Raleigh vine," on Roanoke Island, nearly three hundred years old, covers one acre of ground; the wine from this vine last year sold for $3,000; another vine in Tyrrel County, N. C., in 1869, produced 2,530 gallons of wine; several other large vines in the South produce each from 1,000 to 2,000 gallons of wine per annum.—*Boston Journal of Chemistry.*

Big Trees in Missouri.—It is popularly supposed that California has the biggest trees in the world; but Prof. Swallow, of the Missouri Geological Survey, claims the distinction for his own State. He gives the following actual measurement of trees in south-west Missouri:—"The largest is a sycamore in Mississippi County, 65 feet high, which, 2 feet above the ground, measures 43 feet in circumference. Another sycamore in Howard County is 38 feet in circumference. A cypress in Cape Girardeau County, at a distance of one foot from the ground, measures 29 feet in circumference. A cotton-wood in Mississippi County measures 30 feet around at a distance of 6 feet above the ground. A pecan in the same county measures 18 feet in circumference. A black walnut in Benton County is 26 feet in circumference. A tulip-tree (poplar) in Cape Girardeau County is 30 feet in circumference. There is a tupelo in Stoddard County 30 feet in circumference. There is a hackberry in Howard County 11 feet in circumference. A Spanish oak in New Madrid County is 26 feet in circumference. A honey-locust in Howard County is 13 feet round. There is a willow in Pemiscot County that has grown to the size of 24 feet in circumference and 100 feet in height. Mississippi County boasts of a sassafras that must be king of that tribe; it measures 9 feet in circumference. In Pemiscot County there is a dogwood 6 feet in circumference. In Mississippi County pawpaws grow to a circumference of 3 feet, and grape-vines and trumpet creepers to a circumference of 18 to 20 inches. — *Boston Journal of Chemistry.*

A Large Pear.—A friend has shown us a California pear of almost incredible size. It measures around 13½ inches, and lengthwise 17½ inches. It is now somewhat shrivelled, but it was said to weigh *three pounds* when taken from the tree. The variety we judge to be the Vicar of Winkfield, although not quite certain. These pomological monstrosities are not uncommon on the Pacific coast, but to us they seem wonderful. We should be careful in venturing under trees loaded with such fruit, as the effect of the blow resulting from the fall of a specimen might prove decidedly unpleasant. —*Boston Journal of Chemistry.*

Wandering Weeds.—It is stated that there are now no less than 214 weeds which have been introduced into the United States from foreign countries, and principally from England. As a proof of the rapidity with which useless plants are accidentally brought over the seas, it is said that in 1837 there were only 137 foreign weeds known in this country. As far back as 1672 a curious little volume, called *New England's Rarities*, gave a list of 22 plants which the author considered had sprung up since the English had kept cattle in New England. The author mentions the "plantain," which, he says, the Indians call the "Englishman's foot," as though produced by the tread of the white settlers. The common "yellow toad-flax," it is stated, was originally introduced into the province of Pennsylvania as a garden flower by a Mr. Ranstead, a Welshman, residing in Philadelphia, from whom it has derived the name of "Ranstead Weed." In 1758 this weed had overrun the pastures in the inhabited part of Pennsylvania, and was the cause of bitter complaints from the agriculturists of that day. Chickweed, it is stated, was introduced in South Carolina as food for canary-birds, and in ten years spread for upwards of 50 miles, and now occupies the outposts of civilization. The "Scotch thistle" is said to have been brought to America by a clergyman who carried with him a bed stuffed with thistle down, in which some seed remained. Feathers being cheap in the new country, were substituted for the down which was soon emptied out, and the seed springing up filled the country with thistles. Another account says some enthusiastic Scot introduced the thistle as an emblem of his country, which soon made itself at home and became a nuisance.—*Philadelphia Ledger.*

MICROSCOPY.

Good Microscopes.—"Why should not a microscope be obtainable upon the same terms as a pianoforte?" A large number of individuals who wish to possess a good instrument are deterred by the great outlay it involves *at one time;* but supposing the amount could be spread over, say twelve or eighteen months, they would jump at the opportunity of possessing one. I should imagine that some system similar to Cramer & Co.'s, Moore & Co.'s, and other large pianoforte manufacturers, might be adopted by opticians with great success, and would eventually prove most remunerative to them, as there can be no doubt that they would sell a larger quantity of good and expensive instruments, while, at the present time, students and persons in the middle classes of life put up with an inferior and cheaper article. If some spirited optician would only pioneer the way, I am sure he would be followed by many others.—*C. E. O.*

Dr. J. Matthews's Turntable.—All microscopists who use the turntable are greatly indebted to Dr. J. Matthews for the improvement he has carried out on the instrument formerly in use, and which is described and a drawing added in the July number of 1870 of Science-Gossip. In repeating his excellent principle, I have been induced to substitute rosewood or some hard wood in lieu of brass. I find that glass slides work more pleasantly with wood than with brass; there is less danger of splintering the edges of a thin glass slide by undue pressure, and the wood being more elastic than brass, holds the glass slide equally firm, with less pressure. It is of advantage to make the upper edges of the jaws, where they touch the glass slide, to project a little beyond the lower edges, increasing the grip of the jaws on the glass slide. In the mode of wedging up the wooden jaws, I adopt another form of wedge (also of hard wood), doing away with the slatted wedge, which is rather troublesome to construct, and using a circular piece of wood, on one side prolonged into an arm or lever, and secured by a brass screw, the centre of rotation not coinciding with the centre of the circle. This mode of wedging the jaws gives great power gradually applied, with very little effort, and not any chance of slipping, the jaws and wedge-piece being of hard wood: the table or circular plate is made as usual of brass. This mode of carrying out Dr. J. Matthews's excellent principle reduces the trouble and cost of construction to a minimum, and where the services of a workman cannot be procured, the microscopist may carry it out for himself. To help explanation I have added a drawing.—*J. B. Spencer, 9, Kidbrooke Terrace, Blackheath.*

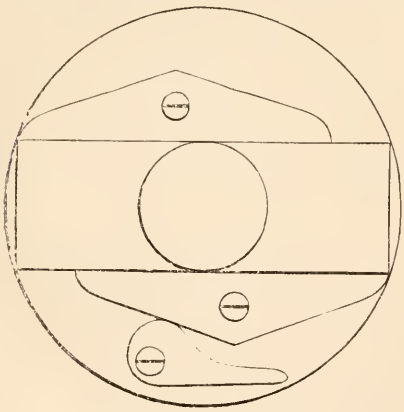


Fig. 44. Dr. J. Matthews's Turntable, two-thirds size.

Universal Mounting and Dissecting Microscope.—This instrument, which has been referred to in the February number of Science-Gossip as "very useful and compact," has been specially designed for the purpose of comprising, in a single portable case, all the requisites in implements and materials for the preparing and mounting of microscopic objects, including a stock of glass strips and covers, and combined with a good, simple, and compound microscope, sufficient for ordinary requirements in collecting and examining objects either at home or at the seaside, &c.; so as to supply the means of preserving objects, whilst fresh, upon the spot, that would be injured or lost if the mounting were deferred until returning home. The compound microscope extends to a power of 200 diameters, and the simple microscope to 20 diameters; and the whole is contained in a case of about 7 inches cube, and so arranged that all portions of the apparatus are readily accessible for use when the case is set open. This instrument has been ably worked out by Messrs. Field, of Birmingham, from my original design, aided by the suggestions of several microscopical friends in bringing it to its present very complete state; and it is being supplied by them at a very moderate cost.—*W. P. Marshall, Birmingham.*

British Diatomaceæ.—We are glad to see a new Guide to the Genera and Species of British Diatomaceæ, by Dr. Donkin, illustrated by Tuffen West. It is being issued in parts, but as only the first part has appeared, we must not at present hazard an opinion. We hope that no pains will be spared to make it worthy of general acceptance as *the* standard work on this subject.

Objective for Gas Lantern.—Can any one who has used an inch objective with an oxyhydrogen lantern recommend such a glass for the purpose? The majority show only the central portion of the object in focus.—*E. C. B.*

NOTES AND QUERIES.

A Remarkable Spring.—About sixty miles north of Galena, Texas, near the town of Liberty, there is a spring, the water of which is quite acid, simulating lemonade, and those who taste it like it so much that they drink it almost immoderately. When you feel hot, it is quite delicious; and under any circumstances, whether you are hot or cold, the drinking of it produces perspiration, with no unpleasant effects afterwards. The spring has no apparent outlet or inlet. It is probably sixty feet across it, and it is covered with a white froth or foam, which upon close examination appears like cream of tartar on a wine-cask. It kills insects, worms, and other small animals that come near and use it. No fish or other evidence of life is seen within its waters.—*Boston Journal of Chemistry.*

Luminous Fungi.—In the interesting and instructive life of the late Professor Harvey (page 290) mention is made of some Australian fungi, "which shed a broad glare of light among the grass and decayed leaves." "Their light was very white, like ghostly moonlight, and so strong that I could see the time on my watch. I gathered some, and found them to be agarics I brought them home, and they retained their lustre till decomposition set in." Has any instance of luminous British mushrooms been verified, or is this singular sight confined to the fungi of the antipodes?—*Frances I. Battersby.*

Woodcocks and Holly-berries.—Do woodcocks often feed upon holly-berries? During the severe frost of January, a pair of these birds ventured within three yards of our parlour window and seemed anxiously searching for food at the foot of a holly-bush which had been covered with berries this season. Apropos to Mrs. Watney's last letter, I remember hearing a clever and accomplished lady visitor exclaim, on perceiving a blackbird pecking crumbs off a window-sill, "Oh what a beautiful yellow-billed raven!" to the intense amusement of some children who had been taught to "understand something of their own planet."* And on showing a drawer of butterflies to a person in our neighbourhood, his first question was "How do you keep them alive?"—*Frances I. Battersby.*

Electric Stockings (p. 45).—The phenomena described by "E. M. P." are very curious. I am not sufficiently versed in electric science to offer any explanation, but I can record some additional facts which may be interesting to your correspondent. It is by no means necessary, in order to produce such results as he describes, that two different materials should be in contact. Hundreds of times, when I have taken off my flannel jacket at night, I have heard the same crackling noise, and the material has seemed to cling together; and if I have done it in the dark, the experiment has produced very distinct electric light. This has generally, if not always, been in frosty weather, after I have been roasting myself at a good fire. Another fact in connection with this is curious,—namely, that, as I grow older, this power of producing electricity seems to be growing weaker; and I now seldom observe the phenomenon which used to be of common occurrence when I was a boy. Evidently some change has taken place in myself. Every one is familiar with the electric nature of a cat: this, too, is most apparent in cold weather and before a fire. On such occasions, if I stroke a cat for some time the right way of the grain, and then hold my hand an inch from the cat's back, the hair will rise up erect and touch my hand; and if I put my knuckle to her ear, I hear a slight report, and feel a decided shock; and the cat feels it too, and disapproves of it; for, after one or two trials, she cringes her ears, and makes her escape. Many children are as electric as cats. If their hair be combed before a warm fire, it will crackle, and will follow the hand and stand on end.—*Robert Holland.*

Electric Stockings.—"E. M. P." will find a rather long account of electric stockings in the "Encyc. Brit.," 7th edition, article "Electricity." A Mr. Robert Symmer first described the phenomenon in 1759. Two black or two white silk stockings, he says, on the same leg produce no effects, but a black and a white stocking "rushed to meet each other at the distance of a foot and a half." He also produced electricity by drawing them on the hand, but the electricity was less powerful than when the stockings were drawn from the leg. He describes the stockings flying to and sticking to the wall, and succeeded in charging Leyden jars by means of them.—*J. R. Davies.*

"Eye-stones."—All the surrounding countries of the Baltic are distinguished by the great number of fresh-water lakes which they contain, and not only those which are mountainous, like Sweden, but also the alluvial soil of the northern coast of Germany. In Mecklenburg alone are counted about 200 lakes. Many of these are rich in fish, as well as in the common Cray-fish (*Astacus fluviatilis*),* which is a smaller relation to the Lobster, whom it much resembles. In the heads of some of the larger of these are found the "Eye-stones," which are often used for removing small particles of dust, &c., from the eye, and which answer exactly the description given by Mr. T. C. Izod in No. 73 of this Journal. It is much to be regretted that the increased demand for this delicate shell-fish has played sad havoc among them, and many waters, which in former times produced great quantities, are now almost devoid of them. Three cray-fish to a pound in weight was no great rarity at one time, while now they are caught when too young to leave any offspring behind them. One of my brothers is living in the midst of a district which was once celebrated for and abounded in cray-fish, to whom I will write for some specimens; and if he will still be able to procure them, I shall deposit them with the Editor of Science-Gossip, who will, perhaps, be kind enough to distribute them to persons interested in them.—*C. Becker.*

"Eye-stones."—A few minutes previous to seeing the "Eye-stone" contributions in last month's Science-Gossip, we had sent to London two operculums (or "fish-eyes," as we call them in New South Wales) to be mounted in gold. As "eyes" in appearance, the convex sides are perfect, dark pupils melting into a bright-green iris, then the white, and arching over all a brown eyebrow. On the reverse, or flat side, are the whirl-markings usual to shell lids. Always thinking our little operculums gems, however common at the Anti-

* Kingsley.

* In German, "Krebs."

podes, and hearing Royalty, while there, has had some like them set as sleeve-links, &c., we have only too gladly availed ourselves of the hint. And now, will some kind reader of SCIENCE-GOSSIP help us to the true name of the shell owning such a wonderful eyelid?—*J. W. K.*

THE DEPTH OF SOIL IN CORNWALL, over hill and dale, will average about one foot. Supposing a beech-leaf to cover a superficial inch, it takes about 35 dead brown leaves, tightly consolidated by pressure in a hand-vice, to form ⅛ of an inch in substance, which multiplied by 8, gives 280 years, necessary to yield one inch of ground; which, again, multiplied by 12, gives a lapse of time of 3,360 years to produce one foot of vegetable soil. Allow another preliminary space, of a few hundred years, for the annual growth and decay of the first scanty covering of lichens and mosses, a period of time of about 4,000 years would pass before the bald hills of a bare world could screen their nakedness from view, clothed in the leafy foliage of nature.—*W. B. Fowey.*

THE TAMARISK MANNA.—I think your correspondent "C." will find a perfectly authentic description of this tree in a work entitled "The Desert of Sinai," by Bonnar. The *Tamarix mannifera* drops in the summer a sort of substance called by the Arabs "*Mann*." This "Mann" falls from the leaves on the ground beneath the tree, and it is soon collected by the Bedouins, who eat it with bread. Many persons affirm that "Mann" does not exude from the trees at all, but that it is formed by an insect which abounds in the *Tamarix*. Others say it is this insect, one of the *Cocci*, that makes a puncture in the bark of the tree, from which the juice exudes, and, becoming concreted, falls in the form of manna to the earth; whilst a few travellers assert that the manna of the Jews was produced by a species of camel's-thorn (*Alhagi maurorum*). Bonnar is a living writer, and, to the best of my recollection, he mentions having seen the manna of the tamarisk.—*Helen E. Watney.*

FOREST FIRES IN THE UNITED STATES.—In many places large tracts of forest have been burnt down from the carelessness or mischief of hunters, who take no trouble to prevent the destruction of the forest by the camp fires. They even wilfully set fire to a tree when entering the forest, in order that the smoke may guide them out again. Few sights are more dreary than that of a burnt forest with the charred and blackened trunks of trees, some still standing, and others tumbled about in the most fantastic confusion.—*Townshend, "Ten Thousand Miles of Travel."*

NATURAL SELECTION (p. 42).—There is nothing remarkable in the circumstance of the water-hen taking refuge in a tree, as mentioned by "G. G.," under the above heading. Every one who has watched the manners of these birds is aware that they are in the constant habit of roosting on boughs overhanging pieces of water. I have myself many a time disturbed them, late in the evening, in such situations, and have watched them fly hurriedly downwards, until they reached the surface of the water. If "G. G." will refer to Yarrell's "British Birds" (*sub voce*), he will find an instance given of a water-hen nesting "in a spruce fir tree, twenty feet from the ground." He also speaks of their perching and roosting on trees.—*W. W. Spicer, Potterne, Wilts*

DESTRUCTION OF PLANTS BY GOATS (p. 47).—A most interesting tree, the bottle palm (*Hyophorbe Barklyi*, Hook. fil.), is fast disappearing under the combined attacks of goats and rabbits. This palm is peculiar to a small island known as Round Island, which forms one of a group distant about twenty miles from Mauritius. It is far from common even in its native home. There are no indigenous mammals on the island, but goats and rabbits have been introduced, and these bid fair to destroy this very curious member of the vegetable kingdom, climbing up the trunk—an easy process, as it is of a swollen, gouty form—and nibbling off the shoots. The young plants, as they spring from the ground, have of course no chance against these tiresome marauders.—*W. W. Spicer, Potterne, Wilts.*

IS THE LANDRAIL A BIRD OF PASSAGE?—In the month of August, 1852, I crossed in a steamboat from Hull to Rotterdam. When we were about forty miles from the Brill, a landrail, flying towards Holland, fell on the deck and was caught. The sailors could not resist the temptation of peering at the strange bird, and he having recovered his strength flew from the basket and recommenced his flight to Holland, which no doubt he reached in safety.—*T. C. Thompson, Ashdown Park, Sussex.*

WHO KILLED COCK ROBIN?—At p. 46 of your February number, it is stated that "Who Killed Cock [poor] Robin was written by the Rev. — Moseley, who is still living." If this be so, he must himself be a hearty old cock. I have the song set to music—I suppose by Dr. Calcott—in the "Juvenile Amusement" entered at Stationers' Hall, 1797. This collection contains most of the old popular ditties, "Who Killed Cock Robin" and the "Multiplication Table" being highly dramatic and clever. If the alleged author be living, and had attained to say 20 or 23 at least, if in Orders when it was written, he must be between 90 and 100 at least. The song, however, is not published with the parade and flourish of a new song, and I doubt not might be traced to a much earlier date than 1797.—*G. B., Bath.*

EGGS OF LEPIDOPTERA.—In SCIENCE-GOSSIP, November, 1870, there appeared some good remarks on "The Eggs of Butterflies and Moths." There is a vast fund of beauty and interest in them, and as is justly remarked in the paper alluded to, "they are by no means common in cabinets." I have a few, but there is some considerable difficulty, first in *finding* them, and secondly, in *mounting* them. I am sure many with myself would feel very greatly obliged if some entomologist would inform us where, *i. e.* on what vegetables and shrubs, we are likely to find them, and perhaps some microscopist would at the same time state the best medium for preserving them. I am inclined to think one part of glycerine to twelve of distilled water is the best; if denser than that, they *shrivel* from exosmose.—*G. H. B., Galten House, Shanklin.*

POPULAR ERRORS.—Can any of your readers assist me in collecting instances of "popular errors," such as—*As blind as a mole, As deaf as an adder?* There are a great many; some are quite local, others extend over the whole of England; and knowing what a large circulation the SCIENCE-GOSSIP has, I thought that mentioning the subject in its pages would be a good way of obtaining instances which otherwise I should not hear of.—*C. K. R.*

The Year-Book of Facts.—We have before us Mr. Timbs's annual volume for last year, and it is not a whit behind any of its numerous predecessors in interest or value. This book has become quite an institution; almost as sure as Christmas Day and Good Friday, it "cometh but once a year." For those who do not take the trouble to learn how "the world wags" in science but once in twelve months, this volume must be invaluable. To others it is useful as a reminder of what has been done, or at least some of it—that which is popular. The portrait of Professor Huxley, and the vignette of the American Gatling Mitrailleuse, are in themselves hints as to the course of the stream in 1870.

"The Cypress of Lomma."—This small account of a most interesting tree, I copy from the *Floricultural Cabinet* of 1858, thinking it might interest some of the readers of Science-Gossip; and also I should like to know whether any of the readers have ever seen it, &c. "This tree is the oldest of which there remain any records. It is supposed to have been planted in the year of the birth of Christ, and on that account is looked on with reverence by the inhabitants; but an ancient chronicle at Milan is said to prove that it was a tree in the time of Julius Cæsar, B.C. 42. It is a hundred and twenty-three feet high, and twenty feet in circumference at one foot from the ground. Napoleon, when laying down the plan for his great road over the Simplon, diverged from a straight line to avoid injuring this tree."—*Thomas Wynne.*

Bees and Soot.—De Quincey, in his "Confessions of an English Opium-Eater," says that, when in the Lake district, he was told that bees make use of soot in some stage of their wax or honey manufacture. Is this an admitted fact? If so, I should be glad to hear more about it.—*G. H. H.*

Gregories (S.-G., 1871, p. 47).—In connection with this name, *cf.* Greygoles, which Halliwell gives as a Dorset synonym of *Agraphis nutans.* A writer in *Notes and Queries*, 4th series, iv. 345, states that this plant is called, in the same county, "Blue Gramfer Greygles," and that *Lychnis diurna* is called "Red Gramfer Greygles."—*James Britten.*

Is the Landrail a Bird of Passage?—The readers of Science-Gossip are greatly indebted to your correspondent "J. B." (Dolgelly), for having called attention to this subject; and probabilities are quite in favour of the suggestion thrown out, viz., that the Landrail remains with us all the year round. For, in the first place, it strikes one as more than likely that a bird so awkward upon the wing would find great difficulty in crossing the sea at even the shortest passage from shore to shore. It is to be hoped that sportsmen and gamekeepers will give us their experience in this matter. Turning to Thompson's "Birds of Ireland" (one of the most interesting of bird-books, and so rich in facts and observations), vol. ii. p. 311, we are told that the Landrail has been seen in late autumn and throughout the *whole of the winter months*, and quotes the following from McSkimmin's "History of Carrickfergus":—"On January the 10th, 1788, eight or ten brace were flushed among the rocks at the Knockagh," &c. This extract would lead to the inference that they are gregarious in winter. Perhaps the fact that these birds do not come much under observation except at the breeding season may be accounted for by their partially nocturnal habits. They certainly become very fat towards the autumn, as though to prepare for winter.—*W. P.*

Dos à Dos.—I have long been wishing to put a query and state the following. Last autumn twelvemonth, when passing through the aquarium at Boulogne, I found an interested crowd gathered in front of one particular tank containing about thirty fish—all of one kind, which I fancied might be mullet—and closely watching their movements. Several of the fish were paired back to back; the under fish poised naturally in mid-water, the upper fish swimming back downwards; and each one, with snouts conjoined, breathing simultaneously. "*Voila! Ils sont accouplés; oh, c'est drôle!*" exclaimed the Frenchers; it was so. For a time I was content to fancy it an optical delusion due to reflection or refraction, but that I waited till I saw some pairs separate, others join. It was indeed droll to watch their gills moving in concert; kissing is a mild term, for a curious bubbling of the water showed that they were interchanging breaths. The point of contact was only at the snout: it was August, and the weather intensely hot.—*A. H.*

Titmice (p. 34).—I can quite endorse Mr. Rudd's laudatory notice of the Tomtit as a sprightly and agreeable aviary bird. I have had a Blue Tit (*Cyanistes cæruleus*, Kaup.) for more than twelve months, and a more pleasant little companion it is impossible to conceive. It is a French specimen, having been procured by me across the Channel, and brought away when driven out by the near approach of the German army to the town in which I resided. Of course it differs in no respect from our English tits, unless it be that it has adopted in some measure the mercurial habits and lively ways of our neighbours—at least as they were before the war! Never was there a more agile acrobat, or more loquacious little twitterer! The door of the cage is opened during each meal, and Tom eagerly takes advantage of the permission given him to fly about the room, or hop fearlessly over the table, perching on the edges of the plates and dishes, and taking tithe of the food that may chance to be present. It is exceedingly fond of fat and butter, and never fails to "leave its mark" on the pats at breakfast-time. It is fed on bread-and-water squeezed dry, with pieces of meat and apple, of all of which it is exceedingly fond. Hemp-seed is quite irresistible, and should the bird fail to return to its home within a reasonable time, a few seeds thrown into the cage are sure to draw it back. It will take them too from our lips and fingers. Its method of climbing over the wires of its cage head downwards, and its many other grotesque habits render this tiny specimen of the bird-world a great favourite. I have often heard that the Great Tit (*Parus major*, L.) is given to peck out the brains of its fellow-captives. I can only say, however, from my own experience, that last year three or four were kept in my house for some months, in a cage with several other birds, and that they all lived on the most peaceable and affectionate terms. The Great Tit is a much larger and more dignified member of the family than our tiny monkey-like friend the Blue-cap; but I much prefer the latter as a companion. —*W. W. Spicer, Potterne, Wilts.*

The Cicada in Brazil.—The main purpose of the *Casuarina* in creation seems to be that of housing destitute crickets,

"a importuna monotona si garra,"

jolly beggars, whose ceaseless chirping and hoarse whispering drown the sound of the human voice.—*Burton*, "*Highlands of the Brazil.*"

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them. We do not undertake to return rejected manuscripts unless sufficient stamps are enclosed to cover the return postage. Neither can we promise to refer to or return any manuscript after one month from the date of its receipt. All microscopical drawings intended for publication should have annexed thereto the powers employed, or the extent of enlargement, indicated in diameters (thus: × 320 diameters). Communications intended for publication should be written on one side of the paper only, and all scientific names, and names of places and individuals, should be as legible as possible. Wherever scientific names or technicalities are employed, it is hoped that the common names will accompany them. Lists or tables are inadmissible under any circumstances. Those of the popular names of British plants and animals are retained and registered for publication when sufficiently complete for that purpose, in whatever form may then be decided upon. Address, No. 192, Piccadilly, London, W.

J. S., jun.—No. 6. *Gemellaria loriculata*. No. 8. *Flustra*, too small for identification. No. 5. *Plumularia falcata*, now called *Hydrallmannia falcata*.

H. M.—No. 6. *Sertularia operculata*—others not British.

H. D.—No. 3. *Peilea hastata*, Lk. No. 4. *Pteris* sp. Of Nos. 4, 5, and 6, specimens insufficient to mark the species.—*J. G. B.*

R. T. A.—It is a mould, but in too dilapidated condition to determine accurately,—probably *Polyactis*.

L. S.—Dr. Prior's "Popular Names of British Plants," published by Williams & Norgate, will just suit you.

T. P. C.—A quadri-foliate leaf of *Trifolium repens*, apparently; but we cannot state positively from an outline sketch.

J. W. C.—Had you carefully examined our first volume, it would have saved you the trouble of writing.

W. W. E.—Oh, dear no! nothing of the kind. They are very common galls, figured, as well as the insects that produce them, in a previous volume of this journal.

R. H. W.—Probably a species of Weevil: we should not attempt to name it without seeing it.

W. H. S.—It would have been quite as easy to have examined the water with a microscope as to have asked of us. You would probably have found nothing.

B. B.—It is useless sending us spotted leaves to name their parasites, unless there is something to examine. The microscope would soon inform you whether any fungus is present. The old fable of "the waggoner and Hercules" is worthy of remembrance.

E. W.—No. 3 is *Polypodium vulgare*, the others insufficient to name.

J. F. C.—We know of no printed labels for foreign shells.

J. C.—We could not judge unless we saw the manuscript.

W. H. B.—Numerous communications on aquaria in all our preceding volumes.

W. N. E. wants to know the best modern work on meteorology.

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Polariscope.—Ox and sheep hoof, trans. and long., for for other good polarizing objects and stamp.—C. D., 187, Oxford Street, Mile End, E.

Liassic Belemnites, very perfect, from Lyme Regis and Charmouth. For recent Echini starfish and crustacea, send list.—Address C. K. R., 2, Redland Vale, Redland, near Bristol.

Eggs of British birds in exchange for British shells.—F. W. Stansfield, Vale Cottage, Todmorden.

Muscular Fibre of Calf.—Slides of this preparation, well mounted, in exchange for other *good* named slides. Send slide to E. Ward, 38, Bradford Street, Coventry.

Barbadoes Polycystina, mounted in symmetrical groups, opaque, in balsam, in exchange for injections or sections of crystals.—George H. Stubington, Station Hill, Basingstoke.

British recent Shells and Fossils offered for British recent Crustacea and Echinodermata.—T. D. R., 37, Arundel Street, Strand, W.C.

Wanted good mounted objects for the microscope, in exchange for Lepidoptera, &c.—H. S., Norwood Lodge, Streatham, Surrey.

Mosses.—*Orthotrichum phyllanthum* for others. Send lists to J. Bowman, Cockan Lamplugh, Cockermouth, Cumberland.

The Rev. John Hanson (late of 1, Bagby Square, but now of 35, Elmwood Street, Leeds) offers Desmids and Algæ for anything good.

Microscopic leaf-fungi and lichens, unmounted, for objects of interest, unmounted.—H. D., Claremont House, Waterloo, Liverpool.

For wings, legs, and eyes of Dragon-fly, send stamped envelope and other material to J. Needham, jun., 27, Approach Road, Victoria Park.

Bombyx Mori, the Silk-worm Moth—eggs—by sending stamps and box to John Purdue, Ridgeway, Plympton, Devon.

For sand containing abundance of Foraminifera, &c., send stamped directed envelope, with any microscopical object of interest, to Sidney J. Tindall, 95, St. Paul's Road, Walworth, S.E.

BOOKS RECEIVED.

"Monthly Microscopical Journal." February, 1871.

"The Canadian Naturalist." Vol. V., No. 2.

"Land and Water." Nos. 262, 263, 264, 265, 266.

"The Natural History of British Diatomaceæ." By Arthur Scott Donkin, M.D. Part I. Van Voorst.

"Characters of Undescribed Lepidoptera heterocera." By Francis Walker, F.L.S. London: Janson.

"A list of Hymenoptera collected by J. K. Lord in Egypt, &c." By Francis Walker, F.L.S. London: Janson.

"The Gardener's Magazine," for February, 1871.

"The correlation of Zymotic diseases." By A. Wolff, F.R.C.S. London: Churchill.

"Boston Journal of Chemistry." Vol. V., No. 8.

"Report of the Cheltenham College Natural History Society for the year 1870."

"The Year-Book of Facts in Science and Art," for 1870. By John Timbs. London: Lockwood & Co.

Communications Received.—H. D.—F. I. B.—C. B.—S. I. T.—C. B. A.—T. P. B.—J. W. K.—W. S. P.—R. H.—H. E. W.—J. N.—J. H.—J. P.—C. H.—J. R. D.—W. B. F.—C. E. O.—J. C.—H. C. S.—J. F. C.—J. K. J.—H. C. L.—C. D.—A. L.—G. H.—L. S.—C. K. R.—A. H.—T. C. T.—F. W. S.—J. M., Jun.—T. W.—J. E—T. P. C.—H. E. W.—J. W. C.—E. W.—G. H. B.—G. B.—W. J.—W. S.—W. H. B.—W. P. M.—C. J. W. R.—R. T. A.—R. L.—J. B. S.—H. E. W.—F. W. M.—H. B.—W. J. S.—H. P.—G. H. S.—W. H. S.—T. D. R.—R. H. W.—G. H. H.—J. B.—W. P.—J. B.—H. R.—W. W. E.—R. T., *M.A.*—C. H.—E. W.

WHAT THE PIECE OF JET HAD TO SAY!

By JOHN E. TAYLOR, F.G.S., etc.

HOW few of the beauties, whose delicate ears, heaving bosoms, and supple wrists I am made to adorn, are acquainted with the faintest outline of my history and experience! Not that I can esteem it my especial privilege to be considered above other common-place objects in this respect, for many others have a biography quite as romantic as my own. But I will leave it to my hearers to say whether my story is not worth listening to.

The period when I was born, and in whose rocks I am most commonly found, is that known to geologists by the name of the Lias. In the lignite portion of its strata, among the "Alum Shales," I occur in my natural state as lumps and nodules. When purest, I am deemed most valuable, on account of my use in the manufacture of the well-known jet ornaments. I am purely of *vegetable* origin—as much so as coal itself—although I am usually considered a species of "black amber." Like the yellow variety which goes by that name, I am electric when briskly rubbed. As a fossil pitch or gum, I am related to the peculiar coniferous flora which grew so abundantly, although in comparatively few species, during the Liassic epoch. The chief features of these vegetable forms I shall presently endeavour to describe to the best of my recollection.

First let me say a word as to the rock formation in which I am found. Why it is called the "Lias" few wise men know, so that I may be excused, seeing this name was given to it so many centuries after my birth. It is usually regarded as a corruption of the word "layers," and I think this is very probable, as the general appearance of the strata is such as to cause such a name to be given to them *par parenthèse*. Thin bands of dark limestone alternate with equally thin bands of dark shale, like so many sandwiches; this "ribbon-like" arrangement is very persistent, at least in England, and from it may have come the name. The modern science of geology includes, in its technical list, many names which had a humble origin among quarrymen and miners. However that may be, I well remember the alternate stages of quiet and disturbance which affected the sea near which I was born. Sometimes its waters would remain calm and clear for years, during which colonies of shell-fish or corals would grow over its bottom, and their accumulated remains form a bed of limestone. And then the waters were thick and turbid with mud, which gradually settled to the bottom, lying on the top of the shell bed, and now appearing as a layer of shale. In fact, the alternation I have spoken of is itself a proof of the physical conditions which affected the Liassic sea. The thickness of the various strata is nothing like so great as that of the older formations, although the fossil remains are far more numerous, both in species and individuals. In the "struggle for life," which had been perpetually going on since the first appearance of life in the Laurentian epoch, many new forms had been developed. The total thickness of the Lias is only eleven hundred feet, and this is usually separated into three divisions, termed respectively the Upper, Middle, and Lower. The upper portion consists chiefly of clays, whilst the middle is composed of "marlstone," crowded with fossils. This is remarkable for its containing iron-ore in such abundance as to be worked for that valuable metal in some localities. The Lower Lias is that most characterized by partings of shale and limestone, already men-

tioned, and is by far the thickest member of the group.

The dry land of this period was broken into a series of undulations, as it is at present, although the mountains were not so high as they are now. The uplands were thickly covered with woods and forests of Araucarian pines and thickets of fern; whilst the lowlands were green with densely-packed cycads, plants now confined to tropical regions. About one hundred species of Lias plants are known to science, but not one has yet been met with which belonged to the class of which the oak, ash, or nettle are familiar examples. Indeed, this group was not introduced until the Cretaceous epoch, which followed the Liassic after the lapse of enormous periods of time. The ferns were remarkable for having reticulated veins traversing their fronds. In the damper places, and by the river-sides, there grew miniature forests of equisetum, nearly allied to existing species. This was almost the only "English" feature about the Liassic landscape. The trees grew in many places on the lowlands by the sea, and the dark mud was often charged with the resin lumps, which, under the name of "jet," now compose my personal substance. Amid this somewhat monotonous vegetation there lived several species of miniature marsupials—the only warm-blooded creatures then in existence—which found the chief means of their subsistence in the hosts of insects which peopled grove and plain. Land reptiles, also, were not absent, both as crocodiles, tree-lizards, and flying-lizards.

This was, indeed, "the Age of Reptiles." Reptilian life was then modified to the various functions now fulfilled by a higher class—the Mammalia. In the air, on the land, in the water, one met with reptilian adaptations at every step. The places now filled by the whales and seals were then occupied by the *Ichthyosaurus* and the *Plesiosaurus*. The great land reptiles (*Deinosauria*), which became so abundant during the later—I may say the continuing "Oolite" period—stood in the room of modern carnivora and herbivora. Instead of bats and birds winging their way through the air, there were groups of *Pterodactyles*, some of them as large as the greatest bird now living. And, just as there is a certain *mechanical* and anatomical arrangement now characterizing the specialized mammalia, and thus fitting them for their various functions and places, so during the "Age of Reptiles" the relatively lower forms were built on the same plan. The modification which converts the limbs of a whale into fins, also converted those of the *Ichthyosaurus* into paddles; the adaptation which provides a fulcrum for the muscles of a bird by fusing two or more bones together, we find applied to the flying-lizards of the Lias period. So wonderfully simple is the great plan on which the Creator has chosen always to govern the development of organic beings.

Sometimes the lumps of resin which had oozed out of the pine-trees floated seawards, and were afterwards buried in the muds along the bottom. At others, the marsh lands where the woods grew were encroached on by the sea, and from terrestrial passed to marine conditions. It was whilst I lay thus that I formed my vivid impressions of the strange creatures which swam above me, and whose deceased bodies occasionally sank down into the mud to rest by my side, until I was rescued, in my mineral condition as "jet," by that complex and greedy being called "Man"! I will endeavour to recall the most remarkable of these creatures. First there was the *Ichthyosaurus*, or rather, several species of that reptile: as its name implies ("fish-lizard"), it was modified to a purely marine life; which its deeply double convex vertebræ also indicate. Some of the larger individuals attained a length of thirty feet, and I remember them going through all the usual routine of their reptilian life in the waters along whose floor I lay and watched. They were carnivorous in their habits, feeding on the larger fishes, and even on one another. To the best of my belief they differed from most reptiles in bringing forth their young alive. Many a time have I seen one of their carcases floating by means of the decomposed gases right over where I lay; by-and-by the gases would escape, and the body sink to the muddy bottom; there it lay and was mineralized, and thence the geologist now disinters it in long ages subsequent to the elevation of this sea-bed into dry land. And his researches bear out the truth of what I say, for he frequently finds the fossilized remains of the reptile's last meal enclosed within the ribs where the stomach once lay, and even the fossil *fœtal* remains of its young within the pelvic cavities. The *Ichthyosaurus* was indeed the tyrant of the Liassic seas; its crocodile-like head was armed with scores of conical teeth, implanted in a continuous groove; the rest of its body was not unlike that of a small whale, having similar paddles and tail.

Still more nearly related to the Lizard family (as its name implies) was the *Plesiosaurus*, whose habits, however, were quite different from its more tyrannical congener. Its head was much smaller, although thoroughly reptilian, and terminated a long neck, not unlike that of the swan, or even longer, for it sometimes contained as many as forty vertebræ: its teeth were implanted in sockets, like those of the modern crocodile, so that, with a neck resembling a snake, a body and tail like those of a quadruped, and having paddles like the turtle, the *Plesiosaurus* had combined in itself structural adaptations now distributed among half a dozen widely separated animals. The largest of these queer-looking reptiles was twenty feet in length. Usually, its locality was by the seashore, in the shallower waters, where, by the aid of its long and flexible

neck, it could dart at and seize the finny tribes as they swam past. It breathed air, as the whale does, and, indeed, as the *Ichthyosaurus* also did. The *Pterodactyle*, or winged lizard, was buried at sea simply because it was sometimes carried out by the wind, or else because its carcases were carried seawards by the rivers; but it sometimes frequented the shallower mud flats on fishing expeditions. Anyhow, its remains were frequently buried in the deposits then forming. If the *Plesiosaurus* was a strange-looking creature, believe me, the *Pterodactyle* was much more singular. Some of the specimens must have been nearly fourteen feet across the spread of wings! Imagine a creature of this kind, possessing a long-snouted, crocodile-like head, and a long bird-like neck, with wings like those of the Bat, a smallish body, and little or no tail! And yet, this type of reptile did not depart from the normal form more than does the Duck-billed Platypus from existing mammalia. The *Pterodoctyle* could perch on trees, hang against perpendicular surfaces, stand firmly on the ground, hop like a bird, or creep like a bat.

So much for the reptiles with which necessity made me acquainted. I cannot speak much for the others, as most of them were not very common until later on. But the fish which lived in the Lias sea were almost as strange, compared with recent forms, as the reptiles. Most or all of them were covered with bony plates instead of scales, each plate being glossy with an enamelled varnish. Among the commonest of these fishes were the *Dapedius*, which had its scales set like a mosaic pavement—hence its name. The *Lepidotus*, or "bony pike," was related to a family still living in Africa and North America, and its haunt was usually off the mouths of rivers, or in estuaries. The *Æchmodus* had a peculiar, "bream-like" appearance, whilst its small mouth was set with sharp, needle-like teeth. The *Acrodus* was a fish which lived on molluscs, &c., and its teeth were adapted for bruising and crushing them. In their fossil condition they go by the vulgar name of "fossil leeches," on account of the fine striæ which converge towards the centre of the upper surface. The *Hybodous* was a fish of somewhat different structure, having shark-like teeth, and very formidable and well-developed spines on the dorsal fins. Hosts of smaller fry abounded, but my recollection does not go back so vividly towards them.

It would certainly be a gross mistake not to recall the appearance of one very remarkable object —the *Extracrinus*, or *Pentacrinus*, as it used to be called. This was the commonest of the Encrinites, which lived in the seas of the period. Of course, my hearers are well aware that this object is nearly related to the "feather-star" (*Comatula*), which is anything but rare in British seas. But, instead of being free, as is the case with the latter object, the *Extracrinus* was usually fixed. Sometimes this was to drifting wood, but usually to the sea-bottom, where it grew in thick submarine forests. In some places the Lower Lias shale is composed of hardly anything else than the remains of these fossils. Frequently they are changed into iron sulphite, or pyrites, and then they have a very brilliant appearance when first laid open with the chisel. This splendour, however, is very transitory, for the action of the atmosphere plays sad havoc with them. The whole structure of the *Extracrinus* was built up of little ossicles, or joints, which fitted one into another, so that mobility as well as strength was obtained. The arms divided and subdivided into an infinite complexity, but all were arranged around the central mouth. One individual alone contained scores of thousands of joints or ossicles, like living nets. These complex arms groped through the waters in search of food. Nothing could be more graceful or elegant than the forms and motions of these extinct crinoids.

In many places the sea-bottom was a perfect aggregation of colonies of conchiferous shells. The *Ammonite* and *Nautilus* floated on the surface, and sometimes crept along the bottom. That strange-looking cuttlefish-like creature, the *Belemnite*, swarmed in such numbers that the internal bones sometimes lay on the sea-bottom in hundreds. One species, at least, of the *true* cuttle-fish lived along with them, for its ink-bag has been found fossilized and its ink so unexpended that the creature's likeness was drawn with it! The *Nautilus* was an old inhabitant of the world when the *Ammonite* was introduced on the stage of existence. As a family, it had reached the maximum of its existence, and was slowly waning into extinction, although it has been able to survive the flourishing class of *Ammonites*, for one species still represents it! Seventeen European species of *Nautilus* are known from the Lias strata alone. But the *Ammonites* were by far the most abundant, and I may say also, by far the most beautiful, of all objects which lived at this time. Nothing could be more graceful and varied than the outward forms of different species. They differed in structure from the *Nautilus* in having the divisional chambers foliated along their edges, instead of being straight. Another leading distinction was the position of the air-tube, or *siphuncle*, which did not run centrally through the chambers, as it did in the *Nautilus*, but along the margin of the outside, or back, of the shell. No fewer than 266 species of *Ammonites* are peculiar to the Lias deposits of Europe, whilst those of Britain alone contain 128. Next in abundance to them were the *Belemnites*—vulgarly called "Thunderbolts"—above mentioned. The Lias strata of Great Britain have yielded 105 species, the British beds alone having produced fifty-seven of them. The *Brachiopodous*, or "Lamp-shells," which were so

abundant during the Silurian and Carboniferous periods, were much more scantily developed in Liassic times. Here you see the last of the *Spirifer*. On the other hand, the true *conchiferous* species, which had lain in the background during the earlier epochs of our planet's history, now began to assert that supremacy which they still hold in even a greater degree. No fewer than 625 species of Conchifera have been found in the European Liassic deposits alone. The commonest among these were the species of *Gryphæ*—a sort of curved fossil oyster, whose abundance sometimes makes up entire beds of limestone. The *Hippodium*, *Plagiostoma*, and *Avicula* are also very common. Of brachiopodous shells, including such familiar types as *Rhynchonella*, *Terebratula*, &c., there are as many as 115 species peculiar to the Lias strata of Europe. Taking the summary of fossils which have been found in the strata of this age in Britain, including plants, insects, shells, and vertebrata generally, there are no fewer than 1,228 species known to science. This, of course, is not all; for the list of known species has been more than doubled within the last twenty years. It belongs to the science of the future to develop the fauna and flora of each period of the past, but I am firmly convinced that its efforts will be only to prove the continuity of the great Life-scheme, whose broken fragments are enclosed in the rocks. And yet, broken and shattered though they are, they are capable of being so put together that man—the last and highest link of the series—is able to spell out the grand plan of Creation, and to turn with mingled feelings of awe and admiration towards its Great Designer!

ROBIN REDBREAST

THE adventurous redbreast that found himself a captive in Beaumaris appears to have taken kindly to his quarters.

I remember once reading of the robin as an ungrateful fellow creeping round your door soliciting even the crumbs; but when summer comes again off he goes to the wood, and is not seen again until the vagabond is driven by frost and snow to visit the door of his old friends. Such is not quite my opinion of this fine songster, which is carefully fed by many both winter and summer; one might almost consider bobby a small philosopher for finding out the when and where to find so many friends to welcome his repeated truants.

I should have been very glad to have heard that the feathered pet of your correspondent, Mrs. Watney, had had something to do in building the nest containing the eggs of the canary mentioned; but, alas! I am of the same opinion as your correspondent,—that is, bobby does not understand it.

The robin in character is secluded, *i.e.* they do not congregate and fly in flocks as linnets, goldfinches, and other birds at spring and autumn; each robin, or pair of robins, have their locality, upon which no bobby can intrude without a combat taking place. In winter you will find them taking possession of some particular spot about a barn, garden, hedge, or tree, from which he will drive an intruder at once away. In a cage he soon becomes tame; but I never knew them sociable with other birds, neither will they agree with each other. I have tried year after year to get them to nest in my aviary, but without success; I find they quarrel at times, one is master for a short time, after which his opponent takes courage, and then the tables are turned; but as a rule they give each other a wide berth. Where robins are kept together, you get very little song, and that only very soft, so that the sweet, melodious, free, and somewhat thrilling song is lost.

It is not by any means an easy task to keep a robin in full song; the best cage for the purpose is the same as those which are used to keep nightingales in,—a cage with a wire front only. He will require raw meat, egg chopped fine, mixed with crumbs of bread, also meal-worms, or other live food, *e.g.* earwigs, spiders, &c.; taking care to let him have a bath frequently; but with all this care it is not a long-lived bird, seldom living over three years in a cage.

Strange notions and odd sayings are often heard about robins; many will not keep a robin upon any considerations, telling you they are so unlucky; others say they are sure to die, and robins never sing.

Some years ago I directed the attention of an innkeeper to a robin singing in the hedge a short distance from where we were standing. He seemed to be a man of ordinary intelligence; yet he thought I must be mistaken, telling me, with an air of assurance, "robins don't sing, sir," adding that he had lived in all parts of the country and never heard a robin sing. Again, a short time ago, being in conversation with an old woman the whole of which time a robin was singing, near the cottage in which she had lived from childhood, and wishing to hear the old lady's ideas of the robin, I said, "How beautiful the robin sings." Evidently thinking I was trying to deceive her, she cunningly said, "That isn't a robin; robins don't sing." The bird was still singing beautifully, but I could not convince her that it was a robin.

Robins sing nearly all the year through, but, retiring to the wood, their song is not so easily distinguished from other warbles. If caged at the proper season of the year, and fed with care, they will sing many months in captivity. To get a loud song, you should cage your bird about the middle of December, not before, nor should it be much after, for you must remember robins are early at nest, and then are very difficult to keep alive; on the other hand, those taken in autumn will live almost

upon bread-crumbs, but do not sing for any length of time, and then not loud; in fact they are not worth anything if caged too soon. If kept in a shady part of a room, like most birds so treated it will sing by gaslight.

It is not an unusual thing for canary hens to build and lay eggs; I have known two hens kept in a cage and both birds build and lay eggs.

As for the robin and canary mentioned by your correspondent, I do not think there is the slightest probability of the eggs being worth anything; it would be indeed a valuable hybrid both for good song and beautiful feather. One can imagine the fine bill, large eye, and red-tinted breast of such a rare mule; but the habits of the two are so different that I am afraid it is more than we shall ever get.

CHARLES J. W. RUDD.

CANDLE-SNUFF FUNGUS.

THERE is no more curious or interesting object to be found in a stroll round the garden than the candle-snuff fungus. Scarcely a stake has stood in the ground through the winter, perhaps as a support to raspberry canes, perhaps for one out of fifty other purposes for which a stake has been required, but it is garnished at its base with this object. How often has the wanderer taken his stroll to see what damage the frost has done, what are the spring prospects, or to count upon summer fruits, without seeing at the bottom of his old stakes two or three or more jet-black, velvety outgrowths with whitened tips? How often has he passed them by, wondering for a moment what they are, or how they came there, and then thinking no more about them? Better confess to the sin at once, and learn something, if it is to be learnt; then go and sin no more. Although so common in such company, it must not be supposed that the stake is essential to the fungus, although some kind of old wood is. Not only stakes, but old stumps, or half-buried old wood, is, in the majority of cases, when left undisturbed long enough, the matrix from whence the candle-snuff fungus is developed. The name by which this fungus is known to some people is not inappropriate, in fact, it is as good as another that we have heard proposed for it, the "stag's-horn fungus." It is very often branched in a similar manner to a stag's horn, but is sometimes quite as simple and uninviting as a long candle-snuff. By-the-by, the time seems to be approaching when "candle-snuff" also will be a term requiring definition. In these days of gaslight, ozokerit candles, paraffine lamps, and other modern inventions, the old tallow candles of our childhood, with their long black "snuffs," are nearly forgotten, and many of the "children of the period" have no experience of "a long snuff." From little more than an inch to three or four inches in length, grow these fungoid snuffs, sometimes in clusters, sometimes only two or three together, and sometimes singly. It is very usual for them to be branched in a forked manner once or twice, but occasionally they are not branched at all. At the base they are more or less rounded, and velvety black. Near the



Fig. 45. *Xylaria hypoxylon*, Conidiophorous state.

apex they are flattened, smooth, or nearly so, and whitened, as if dusted with flour or chalk. This is the appearance presented by its most common condition, in which it does not bear its complete fruit. The substance of the whole plant, except the extreme tips, is tough and corky; there is a mouldy odour when fresh; it dries readily, shrivels very little, and may be preserved for years.

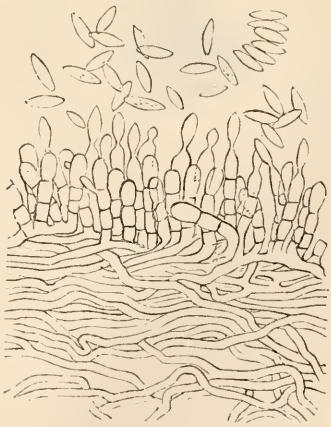


Fig. 46. Conidia of *Xylaria hypoxylon*.

A few minutes will be well spent in examining more closely this barren state, especially the white powder of the tips. The cellular, corky, white

interior portion of the stem presents no extraordinary feature over which we need to linger. If we remove a little of the powdery white substance, and place it in a drop of water under the microscope, it will be found to consist of myriads of colourless cells, of a narrowly lanceolate shape, springing from the tips of transparent jointed threads. These are one form of fruit, it is true, but a very secondary one, and are called "conidia." What relation do they bear to the more perfect fruit to be hereafter described? "Ay, there's the rub." It is very possible that they *do* bear some relation to, or influence the production of, the sporidia, but how? Is it likely that they will ultimately be discovered to have fecundative powers, or will the spermatia be found elsewhere, and these bodies settle down to a secondary fruit, and nothing more? It is very easy to ask such questions —it is well that such questions should be asked, but it is not so very easy to answer them. The answer may come with all-sufficient evidence one day, but at present there is no reply save what is grounded on speculation.



Fig. 47. *Xylaria hypoxylon*, perfect condition with section, and asci with sporidia, magnified 350.

A more complete and perfect form of this same fungus occurs later on old stumps, and sometimes at the bottom of stakes. It is easily detected by the naked eye. Usually more dwarfed, with the tips scarcely paler, seldom branched, and the upper portion swollen, rounded, and rough with little projections; such is the condition to which we allude. Having found such a specimen, let us cut it through longitudinally, and examine the section with a pocket lens. The swollen, roughened upper portion exhibits a number of little blackened points along the margin, close beneath the blackened external layer. These, by means of a higher power, are discovered to be nearly globose cells sunk in the white corky stroma. Each of these cells, when fresh, contains a little gelatinous nucleus. Let us call them immersed perithecia, because the gelatinous nucleus consists of the thecæ or asci, hereafter to be described, around which (*peri*) is the cell-wall of the perithecium. These perithecia have a pap-like projection at the apex, which causes the roughness of the surface of the clubs. Ultimately each of these projections is pierced with an orifice, through which the sporidia escape.

Suppose that when one of these mature clubs or horns is found it is dry, and the gelatinous contents of the perithecia are dried up to a whitish coating of the interior wall. What is to be done in such a case? Simply immerse the whole fungus for an hour in water, and, unless very much dried, the cell-contents will resume more or less of their gelatinous character, and be ready for examination. Then pick out one or two of the perithecia, or, better still, cut through them, and pick out the contents of one or two on the point of a needle, and transfer them to a drop of water for examination. A quarter-inch objective will be necessary. There are to be seen long cylindrical transparent sacs, each containing eight dark-coloured bodies, in a single row. These are the sporidia contained in the thecæ or asci. Side by side are long, colourless hair-like filaments, called *paraphyses*, the origin and functions of which, notwithstanding all that has been said, or supposed, are obscure. The sporidia are dark-brown, nearly opaque, of an elliptical shape, with slightly-pointed ends, sometimes curved, so as to be almost sausage-shaped, and when not quite mature each contains one or two nucleoli. These are the fruit, somewhat analogous to the seeds of higher plants, and by means of them the species is reproduced. It is not difficult to cause the sporidia of many fungi to germinate freely in water, and not an unprofitable occupation for a leisure hour. When the sporidia are fully matured, the asci or sacs which contained them are ruptured, and the sporidia escape and make their way out of the perithecia by means of the orifices in the pap-like projections already alluded to. Such, then, is the structure of the candle-snuff fungus, or, at least, it is a brief account of some of the most important features, because the minute examination would furnish something to be said about the corky stroma, and the cortical layer, and the velvety hairs; but all these may be left for the reader to examine for himself, having aquired a knowledge of general structure. It only remains to be stated that the name by which this fungus is known to botanists, is *Xylaria hypoxylon*, and that it belongs to the *Sphæriacei*. All the mysteries of classification we will leave the student to obtain from some work devoted to the subject.

This is a very common object. He that hath

eyes to see, and useth them, will find it during almost any half-hour's stroll on some old stump by the wayside—unless the said stroller should be addicted to taking his stroll amongst the busy haunts of men. With a hedge on both sides of him, and green trees for shade, he need not travel far in search of the "Candle-snuff Fungus."

LOCUST GOSSIP.

IN putting together a few notes on these interesting insects for SCIENCE-GOSSIP, I do not feel that any introduction is needed. The grasshopper form is so well known, and their habits so closely resemble these insects, that I purpose rather to describe my actual experience of them as met with in India, than to enter into any scientific account of them. I had been more than twenty years in the country before I saw a locust, and strangely enough the first flight visited my station, where Dr. Jerdon, who had been, very many more years than I had been, a resident, was staying with me, and he, too, had never witnessed a visit of these insects. It was September 13th, 1863, when, just after luncheon, it suddenly became quite dusk, and the servants coming in told us that the locusts had arrived, and so we went out to see them.

The whole sky, as far as the eye could reach, in every direction, was full of them. They flew from the north-east at a great pace, with a strange rustling filling the air with sound, which seemed to come from every point, and were much scattered in their flight, which ranged from thirty to two hundred feet from the ground. The wind at the time was blowing from the north-east, and they were borne along upon it. We were upon the flat terrace roof of the house, desirous to capture a few for specimens, and the way in which they avoided the swoop of the insect-net was astonishing. Many settled on the tall trees of the place, and then, after resting a little, flew off again. Presently, from our high post of observation, we noticed them returning, having been turned by a storm of wind and rain which was coming up from the south-west, and which advanced to within about a quarter of a mile of the place where we were standing. They faced round, and every one they met turned with them, and hurried towards the north-east, as did those which had alighted in the trees. A few settled on the ground, and these were very active. They were of a red colour, and appeared to differ slightly from the well-known "migratorius," a specimen of which I had by me, taken in the Indian Ocean, 800 miles from the nearest land. In size they were three inches long, whilst the expanse of the wings measured nearly five inches. About ten minutes or a quarter of an hour after this there came up a heavy storm of wind and rain from the north-east, with a little thunder and lightning; this *again* turned them, and they were floating rapidly past, when a terrific down-pour of rain obscured all from our view, and caused them to settle on every tree in which they could find shelter.

One "emli," or tamarind-tree, standing in the middle of a large field, was so covered with them, that, at a little distance, instead of the brilliant green for which this tree is noted, it appeared of a dull red. Next morning there was not a leaf left, only bare twigs; whilst under the tree there must have been nearly half an inch of excreta. The morning was wet, and there were only a few which had been left, flying off the trees when disturbed by the crows, kites, mynas, squirrels, &c., all of whom were feeding heartily upon them. I now organized several parties to catch them, and soon filled six large earthen jars. About 10 a.m. many thousands were flying about, and I expected great damage. The sun, however, came out and with dried wings they all departed. They first rose into the air like a pigeon, gyrated a little, and then went straight off to the north-west.

The whole of this flight, from a careful examination we made, appeared to have been young males.

The crows caught the flying insects most cleverly in their claws, and ate them as they flew along. Often I noticed that they dropped them, having pecked off the abdomen. This did not prevent the locusts still flying, although they soon came to grief, and fell to the ground, when the mynas and other birds rapidly pecked them to pieces. At one time I thought the crows released them in consequence of a sharp kick given by the spined legs of the insect.

In the evening I had asked two gentlemen to dinner to meet the doctor, and I gave them a curry and croquêt of locusts. They passed as Cabul shrimps which in flavour they much resembled, but the cook having inadvertently left a hind leg in a croquêt, they were found out, to the infinite disgust of one of the party, and amusement of the others. Here is a receipe for cooking them, taken from the *Akhbar*, a native Algerine journal, under date August, 1866. *Criquets à la Benoiton.*—"Take the locust gently between the finger and thumb of the left hand; cut it in two with a knife, and pour into the animal inside a small quantity of good rum; let it stand two days, and then cover it with a fritter-paste and fry them. Then sprinkle with sugar, and pour into the dish a small quantity of Burgundy." I never tried it. The bodies were as tough as leather in the curry, and quite uneatable; but the croquêt, in which they were well broken up after having been deprived of their legs, heads, wings, and wing-cases, were very fair; and if thoroughly sun-dried with a little salt, I can fancy,

when ground and mixed with other food, they would be very tasty. Our Mahomedan servants ate them, and they told us how that in many parts they were extensively used, being dried and kept in sacks. All animals, such as cattle and camels, are said to like them; and amongst birds, the only ones that did not touch them, were the doves and parakeets—both vegetable-feeders.

On the 16th September there were three more large flights, extending for miles; but as very few settled, little harm was done to the crops. The appearance of a flight in the horizon is curious. It is like a thin dark streak, which increases in density every moment till it has arrived. It is often several hundred feet in depth, a mile or two miles, and some three or four miles, long. Any computation of the number of insects of which such a swarm consists, would be quite impossible. What strikes every one as they approach, is the strange rustling of millions on millions of crisp wings. Often after this there were flights, but it was impossible to trace their direction, nor is it certainly known where they generally breed. Many swarms settled in the Punjab, where they laid their eggs in the ground, and thousands of men, women, and children collected these, and they were destroyed. Still many remained, and the young wingless larvæ crawled over the ground, creating far greater havoc then their winged parents. Some say that they come across the Himalayas. That they do not always succeed, is quite clear from the following.

In June, 1864, there was published an account by Mr. Shaw of the flight of locusts he had found destroyed on a glacier, near the head of the Ravee river in 1863. This extraordinary sight is thus described by him:—"The whole surface of the glacier, over an extent certainly equal to a square mile, was covered with dead locusts. A thin coating of snow, which had fallen a day or two before, and had, probably, caused their death, had melted in most places, and showed the locusts spread an inch or two thick, and apparently preserved by the cold. In the crevasses, which were very frequent and regular along the side of the glacier, the locusts were heaped in such numbers as to fill up the narrow fissures ten or twelve feet deep. The brown bears had come up by dozens to feast on this new delicacy, and our coolies, who had gone ahead of us, reported that they had passed several bears, one of which was feeding so eagerly as scarcely to notice their neighbourhood. This swarm of locusts consisted of the red kind that visits the Kangra valley at the beginning and end of the rains." I kept an account for some years of all the flights, recorded by the different Indian papers, with their directions, but I am sorry to say I could not deduce any theory to account for their sudden appearance, nor have trans-Himalayan travellers confirmed the theory of their coming thence.

When they do come, every one turns out with pots, kettles, and pans, and makes as much noise as he can. This certainly prevents them settling and I thus twice saved my garden, and trust never to see them again.

C. Horne, F.Z.S, late B.C.S.

THE HOME OF THE SWALLOW-TAIL (*Papilio Machaon*).

It is not every reader of Science-Gossip whose lot is cast in a land tenanted by that beautiful, and one of the largest of the British butterflies, the Swallow-tail (*Papilio Machaon*); and a few words relative to the haunts and habits of that conspicuous species, may, perhaps, not prove uninteresting to some of its numerous entomological readers.

There are few counties in Britain that can now boast of this beautiful butterfly as numbering among their entomological productions, but where it is indigenous it occurs often in considerable abundance. Many localities are recorded in entomological works, but with most of them it is now "a thing of the past;" but there are still a few where it may be sought after with a pretty fair prospect of success; amongst which may be enumerated Wicken Fen, in Cambridgeshire, Yaxley, and Whittlesea Mere; to which I may also add, last but by no means least, Horning and Ranworth Marshes, in Norfolk. In these two places it is of annual abundance, and they are the sole localities from whence I glean these few notes. These places are well known and explored by every Norfolk entomologist, being rich in entomological productions, not only Lepidoptera, but innumerable Coleoptera, and many of the Neuroptera. Rusties entirely ignorant of entomology, residing here, well know the Swallow-tail, for the name of this insect has of late years become with them "familiar as household words": both the larvæ and perfect insect are yearly sought after by many of them, and brought home in considerable abundance, fed up and disposed of at a trifling cost to entomologists on their visits.

Many a bright summer morning, ere the dew is off the grass, have we set out, leaving far behind the busy hum and bustle of the city, laden with the required paraphernalia, with intent to breathe the fresh and bracing atmosphere of the country in paying a visit to the home of the Swallow-tail, feasting both eyes and ears on the sights and sounds of the insect world, as we wend our way, net in hand, through grassy meads and country lanes. By-and-by we arrive at the marshes, not at all pleasant places to walk about, but forming a decided contrast with the dusty road we have just left behind. We are now fairly on our hunting-ground, and as

we look around us we see insect life in abundance; the Dragon-fly darting hither and thither amongst the rustling reeds that margin the ditch, or stopping to alight on the stately Flowering Rush (*Butomus umbellatus*), a graceful aquatic, which we notice waving here and there—

> "'Mid the flags that fringe the streamlet's bed,
> The stately *Butomus* rears her head,
> Like a Naiad crowned with a flowery wreath,
> She rose from the waters that flowed beneath.
>
> "It was lovely to look on that splendid flower,
> So richly endowed with beauty's dower,
> And when we turned from the river's shore,
> To our homes the graceful stranger we bore.
>
> "But the glow of her roseate charms had fled,
> When a few fleeting hours had passed o'er her head,
> For no more 'mid the grass in the verdant mead,
> Did the tranquil waters her loveliness feed.
>
> "And fancy might dream that the pale leaves sighed,
> As though they mourned for the flowing tide;
> She could not live from her home afar,
> And she faded before the evening star."

As expressed in the above lines, the Flowering Rush, like most water-plants, when gathered, soon droops and withers; but when growing, it forms a beautiful contrast with its neighbours, the yellow Flags and white Water-lilies.

As we wend our way still further amongst the long grass, we now and then disturb an unwary individual of *Plusia gamma*, who does not quite appreciate our company, and darts off in an instant, and after flying a few yards, finds himself once more amongst the grass; we say, *Requiescat in pace*, for we do not care to capture him.

Still further on, we come to an *olla podrida* of wild flowers of various species, which, as we approach, remind us of a many-coloured carpet, consisting of thistles, meadow-sweet, and an abundance of other flowers intermixed with the long grass. As we wade through them up to our waists, we find them tenanted by many of the common species of butterflies, and here and there a Swallow-tail may be seen quietly sipping the sweets therefrom. The least disturbance, and off he flies. Now begins a chase! We are off after him, now and then over a ditch, following him up as cautiously as possible; now he has settled once more; one good strike with the ring-net, and he is a prisoner and fluttering in vain for liberty. After being safely deposited in the collecting-box, we retrace our steps, wiping the perspiration from our foreheads, in search of more treasures.

When undisturbed, the flight of *Papilio Machaon* is not by any means a swift one; but the instant he becomes aware of an intruder he darts wildly about, and deigns not to alight until he has satisfied himself that all is safe once again. A field of clover or lucerne, when in full bloom, seems to have a great attraction for him, and he is easily captured when sipping the sweets from the flowers; it is pleasant to watch him when thus engaged.

The larvæ of *Machaon* may be found feeding on the leaves of the Wild Carrot (*Daucus carota*), which grows here in considerable plenty: I have myself taken numbers of them, and find they thrive well on the leaves of the common carrot. It is very interesting to watch them feeding; they keep to their food, as is not the case with the larvæ of many other species.

I have not yet been able to ascertain whether this species can be induced to breed in confinement: I have several of the pupæ now, and think of trying the experiment, should they emerge; and should I be successful, I shall have great pleasure in communicating the result to Science-Gossip.

Norwich. R. Laddiman.

CUPHEA PLATYCENTRA.

THE summer of 1865 was, in this part of England, a dry, warm season, and the fine weather was continued until very late in the autumn. Of course we had nothing like the drought of 1868, or



Fig. 48. *Cuphea platycentra.*

of last year; but it must have been a somewhat remarkable summer as far as vegetation was concerned; for I find it recorded in my notes that on

October 12th, an immeuse ivy-tree, which completely smothers one of my buildiugs, and of which we are uot a little proud, was in full flower, aud was througed with various flies, bees, and wasps; and this tree does not usually flower till November. Also, that on the same date *Magnolia purpurea* and *Weigelia rosea* were in flower a second time; and that a tulip-tree in the neighbourhood produced fruit. This is no uncommon thing near London, but is unusual so far north.

That same autumn *Cuphea platycentra* ripened seed out of doors. Every plant in my garden produced a considerable number of apparently ripe seed-vessels; and I was much struck with their peculiar mode of dehiscence, and I made the accompanying drawing at the time.

In ripening, the coloured calyx became persistent, but gradually dried up as the seed approached maturity. All this while the capsule within the calyx was swelling, untill the seeds were ready to be shed. Then the free central placenta, with its seeds attached, began to move, and to exhibit the following curious phenomenon. It rose up from a horizontal positiou, became perpendicular, and finally bent backwards towards the stalk, in the manner shown in the drawing, and in so doing it pushed its way through a dorsal suture in the capsule; and through a corresponding slit in the calyx, the point of the capsule remaining closed, aud the upper part of the calyx iutact.

In Masters's "Vegetable Teratology" (p. 210), there are very excellent drawings of a similar appearance that was observed by Morren in *Cuphea miniata*, and described by him as a monstrous condition of the flower, to which he gave the name of "Gymnaxony."

From the fact, however, of my having observed so many similar iustances in another species, I should be more inclined to think that this is not a monstrous condition of the flower, but is the normal method of dehiscence iu the genus Cuphea. Further observations will be acceptable.

Mobberley, Cheshire. ROBERT HOLLAND.

CLEVER TOMTIT.

WE all know how hard the poor birds have beeu put to it this cold winter, for something to eat. What I am going to say, however, shows that some of them, at all events, have been fully equal to the emergency.

Being in the country, in Gloucestershire, at the time when the snow lay four inches deep on the grouud, I heard of the strange devices of some tomtits, for keeping themselves from starving. Determined to verify what I had heard, I went to see, and here is what I saw.

The ground was, as I have said, covered with snow; it was about ten o'clock in the morning, and the sun was shiuiug. I took up my position in the garden, near some beehives, choosing a place where I should be as little observed as possible. After I had waited a short time, down came a tomtit, alighted on the hive, and began tapping it with his bill. He stood just over the hole in the bottom rim of the hive, where the bees go out and in. Soon the object of his tapping became apparent; a bee crawled out, and was immediately snapped up. After devouring the body of his victim,—his delicate palate rejecting the wings, legs, and head,—he began again tap, tap, tap, as before. He was uot long suffered to enjoy his well-earued breakfast iu peace; for the gardener, an enemy of course, to all birds, was ready with his gun to murder him. Poor fellow, he deserved a better fate!

"The young rascals comes every mornin' regular, especially if the suu's shinin', because the bees comes out easier then; but I always takes good care they shan't come a second time," said the gardener. He had shot four already that morning.

This little story proves the insauity of the wholesale murder of little birds, as though they did nothing but harm. It proves it in this, that it shows the iusatiable appetite of tomtits for insects; and, believe me, they are not alone in this respect. Now, although the bees were kept for amusement, still thousauds of grubs, wasps, earwigs, aud beetles are not; and these are what tomtit likes when he can get them, and the time when he cannot is but very short.

I may here add a few words of advice to beekeepers; that the hives should be well guarded from any chance rays of sunshiue iu severe wiuter weather. The day on which I watched the tomtit was a very bright one, aud as the bechives were rather exposed to the sun, a great many bees came out about 12 o'clock. Though bright, it was severely cold, aud the bees becoming numb as soon as they had left their hives, fell on the snow aud died. I couuted as many as a hundred lying about. I picked up one which was apparently dead, and taking it indoors, placed it on the mantelpiece. The heat soon restored it, and it flew to the window, and buzzed away quite heartily.

Worcester. WM. J. SMITH.

THE PINEAPPLE.—Lord Bacou mentious this fruit iu his Essay on Plantations or Colonies, but does not notice that it had ever been brought to Europe in his time; nor do we meet with any mention of its having been seeu iu this country prior to 1657, when Cromwell the Protector received a present of pineapples.—*Phillips*, "*Fruits of Great Britain.*"

STELLATE HAIRS OF PLANTS.

ALTHOUGH from time to time vegetable hairs have formed the subject of short papers in the pages of SCIENCE-GOSSIP, there are still many exquisite examples to be found on the most lowly of the plant creation which are passed by unheeded by many.

The most wonderful and attractive forms are the "stellates," some of which have already been noticed. A splendid example, however, is found on a low-growing herbaceous plant, bearing yellow flowers, named *Onosma tauricum*; the whole plant, which grows in rough stony places in its native



Fig. 49. Hair of *Onosma tauricum*, × 90.

habitat, being covered with the very remarkable hairs shown by fig. 49, which give it a very rough feel to the touch. They are large enough to be visible to the unassisted eye; the longer ones on the under side of the leaf, measuring on the average as much as $\frac{1}{15}$ of an inch between the extreme tips. Under the microscope they appear to be composed of the clearest crystal, and nothing can exceed the beauty of these gems, whether regarded singly or arranged in their unvarying plan on either side of the leaf; the somewhat opaque whitish excrescences at the base of each branch of the star are prominent, and form one of the most striking features of this hair. The central spine is much longer than those forming the rays, and in the living plant stands almost erect. Its surface is tuberculated, resembling the spicules of Gorgonia. The whole hair is so firmly attached to the cuticle that it cannot be separated without removing a portion of that with it.

Fig. 50 is a beautiful oblongo-stellate hair, taken from the leaf of *Alyssum alpestre*, a native of the Pyrenees and mountains of Switzerland. The whole plant is covered with these splendid hairs, giving it a silvery appearance.



Fig. 50. Hair of *Alyssum alpestre*, × 90.

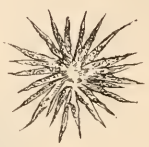


Fig. 51. Hair of *Alyssum spinosum*, × 90.

A single leaf is a most beautiful and interesting object under the microscope, with 1-inch objective, and brilliantly illuminated; the hairs themselves are covered with nodular protuberances similar to those of *Onosma* and equally crystalline in appearance.

Fig. 52 is taken from *Alyssum montanum*. These hairs are somewhat similar in appearance to the preceding, but more complex, having eight arms, each furcated, and of varying lengths. They are somewhat smoother than those of *A. alpestre*.



Fig. 52. Hair of *Alyssum montanum*, × 90.

Alyssum spinosum has hairs smaller and more nearly approaching the stellate type, fig. 51. They cover the plant very thickly, giving it a glistening or frosted appearance.

The real use of these beautiful leaf-appendages seems to be somewhat obscure; but may they not be of value in determining the species of plant, to which they belong?

Fulham. JOHN CARPENTER.

ACORNS.—John Ellis has discovered that acorns can be preserved in a state fit for vegetation for a whole year, by enveloping them in beeswax other seeds may be conveyed from distant countries by the same means.—*Phillips*, "*Fruits of Great Britain.*"

THE SEA AND ITS WONDERS.*

THE English publishers of Michelet's enchanting and beautifully-illustrated "Bird" have produced a marvellously cheap and elegant volume for the young, which we recommend with confidence as a gift-book for little folks. Having tried the experiment, we have found it to answer our most sanguine anticipations, and we advise all our readers who have young folks to please to go and do likewise. The illustrations are profuse and excellent; the paper, printing, and binding all that could be desired. Our only regret is that we do not know of more such books, and at such a moderate price, suitable for like purposes. As an example of the style, we extract one of the chapters, called—



Fig. 53. Shells of—1. *Triton imbricata*. 2. *Nautilus pompilius*. 3. *Helix ovata*. 4. *Argonauta papyracea*.

The Pearly Nautilus.

"There is a relation of the argonaut that makes a shell with chambers in it.

"This is a shell which no doubt you have seen many times, for it may be met with in every collection of shells.

"It is called the pearly nautilus.

"The creature that lives in the shell is so timid, and keeps in such deep water, that it is very rarely caught sight of. Only once has the shell been taken with the animal in it.

"It was floating on the sea, and looked like a dead tortoise-shell cat.

"The captain of the ship sent off a boat for the purpose of finding out what the object really was.

"But the creature began to sink so fast, that it was with the utmost difficulty it could be caught.

"Indeed the shell was broken by the boat-hook striking it so quickly.

"For no time had to be lost. In a minute more, it would have escaped.

"The mollusc that lived in the shell was thus, for once, found at home.

"It was firmly fixed to each side of the shell, and had a mantle of a purple colour, with a reddish tint, and with spots of a deeper colour still.

* "The Sea and its Wonders. By Mary and Elizabeth Kirby. London: T. Nelson and Sons."

"This is the only instance of the creature being carried away in its shell, and exhibited as a curiosity.

"The shell of the pearly nautilus is as curious as it is beautiful.

"It has a number of chambers in it, one after the other.

"The last formed is the largest; and here the creature lives, the empty rooms being behind it.

"At first there was but one room; the creature lived in it. But that wonderful membrane of its went on secreting shelly matter, until it had formed another.

"When all the chambers were finished, and as it were shut up, the nautilus had attained to its full size. Then it lived in the last cell of all, having crept to it through the rest.

"A fleshy tube unites all these chambers together, from one end of the shell to the other. This tube ends in the body of the animal, and increases with its growth.

"Ages and ages ago, when the lily stars were in their beauty, a kind of nautilus that is now extinct lived in the sea.

"The remains of the shells are found in a fossil state, and are called ammonites."

The two woodcuts illustrating this extract are from the work itself, kindly lent for this purpose by the publishers.



Fig. 54. Ammonite.

Cyclostoma elegans occurs abundantly a few miles N.W. of Ripon, at Hockfall, on the magnesian limestone.—*J. S. T.*

CHIPS FROM AN AMERICAN WORKSHOP.

By Professor Arthur Mead Edwards.

IN every fraternity, I presume, there, after a while, come into use certain words or phrases which are perfectly understandable to the initiated, and to them mean a great deal, although they may appear very meaningless to outsiders.

I have found that microscopists, as a general thing, are more addicted to the use of this kind of technical slang than, perhaps, any other class of persons with whom it has been my fortune to associate. Among us, at the American Microscopical Society, is to be found a plentiful supply of this article, but we have one pet term which possesses, for us at least, a deal of meaning. Thus, when any one makes known any particular method or contrivance, way or manner of manipulating, or piece of apparatus, it is a "Dodge." And, furthermore, to be a true dodge, it must originate with an amateur; manufacturers and dealers only originate "pieces of apparatus." But this special term dodge is more particularly and specially reserved for, and used to designate, little labour- or time-saving machines of home manufacture.

Now, as I desire to do all that lies in my power to help on my fellow microscopists, it is my intention in this communication to bring to their notice some dodges which have originated in our society, with the hope that they may prove as acceptable to others as they have been useful to me. And I

make them known through your journal, Mr. Editor, because I know it is seen by all microscopists on this side of the ocean, as I feel must likewise be the case in England. Unfortunately, we have no medium published in this country, as yet, through which microscopists can communicate one with the other; so we have to depend on you and *collaborateurs*, the Quarterly, the Monthly, and the Journal of the Quekett Club; all of which we welcome with open arms.

My first dodge, then, is a form of drop-bottle to hold test-solutions, as acids, staining material, and the like, which are so commonly used in small quantities applied directly to the object whilst under examination upon the stage of the microscope. Bottles with nicely-ground and tapering stoppers can be procured, we are informed, in London, but not readily in New York, or even if they can, they cost considerable, an item worthy of very serious consideration by beginners; besides, they do not answer for all purposes, for only a drop of a certain and small size can be taken up at one time. It is true that there are those little bottles having caoutchouc-covered funnels fitted into their necks, but I never found them very useful; and they, too, cost money, less or greater, depending upon the conscience of the dealer. With all of these, if a large quantity of the fluid is required, it must be fished out in successive drops. Now my contrivance, or dodge, does away with all of these objections; with it a small drop or a large quantity, as desired at the time, can be taken up; and above all, the greatest recommendation is that the apparatus can be got up by any one in a few minutes, and costs very little.

The first form it assumed was a small narrow-necked phial, having a perforated cork, through which a glass tube was passed, and this glass tube was drawn out to a fine orifice at its lowest extremity. By means of such a dip-tube, of course, any amount of the contained liquid can be extracted, shifting the tube up or down through the cork as occasion required. But after several such bottles had been in use for some time, there was found to be one very great objection to it in this form. That is to say, many of the liquids, the alkaline solution for instance, acted upon the cork, and in time it also shrunk, and dried so that the liquid evaporated. Of course, a little will also evaporate through the tube itself, but this amounts to very little, except in the case of alcohol, ether, or the like. So that I have modified my dropping-bottles, and use a short piece of caoutchouc tubing about half an inch long, placed around the glass tube, and in lieu of the cork. This fits perfectly tight, is unacted upon by most reagents, and, at the same time, is somewhat elastic, so that the tube is not easily broken by an accidental blow, if it happen to be struck sharply when reaching across the table. Then, again, the upper end of the tube may be stopped with a cork to prevent evaporation, or, what is still better, the caoutchouc tube attachment may be applied at top, as described in SCIENCE-GOSSIP, vol. iv. p. 260. But I think our curator, Mr. Jackson, who is well known amongst us as a great contriver of dodges, has suggested an improvement on this rubber tube at the top of the pipette.

In our apothecaries' shops, and I suppose in yours also, are to be found so-called "nursing-bottles," which have attached to the end of their exit-tubes caps or "nipples" made of caoutchouc. One of these may be slipped over the end of the pipette, and the little hole in its rounded extremity stopped with a drop of sealing-wax. When this is compressed, the air is driven out of the tube; and when the pressure is removed, the fluid enters and is retained as long as we like, to be driven out by pressing the rubber bulb again.

My next dodge is a movable table or stand to hold both the microscope and lamp, so that they can, together, be passed about from one person to another sitting at the same table. This also can be made at home, and costs very little. It consists of a stout piece of board made of such wood as is heavy, and which does not readily crack or change shape by shrinking or warping. Black walnut I find to answer very well, and to be sightly at the same time. But it should be oiled so as to prevent its absorbing moisture. It is cut into a triangular form, and has the corners rounded off. The size is such that the lamp will stand in one corner, whilst the microscope occupies the position midway between the two other corners, and is at a convenient distance from the lamp. In the under side of the board and near the corners are screwed three small china drawer-knobs, and upon these the stand rests and moves. These smooth polished knobs are much better and steadier than castors; and besides, with them the stand can be moved in any direction, as they freely slide over a table-cloth or varnished-cloth covered table, and do not mark the surface any more than castors. I am aware that something of the same kind as this has been proposed before, but not so simple in construction, and which could not be so readily made at home, and cheaply.

Dodge number three is of another kind, and just as practical as numbers one and two. As microscopists are so numerous, many of them must possess instruments having such thick stages that although they may be occasionally tempted to try their objectives with extremely oblique light on some "rhomboides" or "pellucida," yet they are unable to do so. And here excuse me if I remark that this seems to be an almost universal fault in the English stands. With us, on the contrary, the fact that any stand may fall into the hands of a resolver of fine-lined test-objects is so generally understood by our makers, that they make the stands of both their low-priced and large instru-

ments so that they can be so used. Of course there are exceptions, and it has been to meet these that I have contrived the piece of apparatus I am about to describe. In fact it was to assist just such hungry inquirers after knowledge, and lift them over their difficulty, that I contrived my supplemental stage. It consists of a sheet of brass a trifle thinner than an ordinary slide. This is cut and bent in such a manner that there is a plate of the same size as an ordinary slide, only having a hole in the middle which rests upon the stage of the microscope and is held in position by the spring clamps attached thereto. The hole in the middle is not necessary, but sometimes convenient. From one of the longer sides, the one next the observer, rises an upright, which is part of the original sheet of brass bent, or it can be soldered on afterwards. This projects upwards about three quarters of an inch, and is then bent at right angles so as to run parallel with and over the bed-plate, where it has its middle portion cut away, so that it, in fact, becomes two strips, each about a quarter of an inch wide. At an inch and a quarter from their upright portions these strips are again bent, but this time over something round, like a cedar pencil, so as to come down again on top of the horizontal supporting portions, and form spring clips, by means of which the slide is held in place when laid upon the slips themselves. Using this contrivance, the slide is held above the stage of the microscope, having absolutely nothing under it to obstruct light of the greatest obliquity.

And, lastly, a cheap form of amplifier by means of which the magnifying power of any objective and ocular may be doubled or even enlarged to a greater extent. The idea of this dodge we owe to Mr. E. C. Bogert, the worthy Treasurer of our Society, another dodge-contriver. This is simply a double-concave lens, such as is used to form the eye-lens of common opera-glasses. These are very cheap, and when placed between the ocular and objective, increase their magnifying power very greatly, without interfering to any great extent with the definition.

At some future time I will send you a few more chips struck off from our active Society.

THE WRYNECK.

THE adaptation of the structure of the Wryneck to its habits is not inferior to that of the Woodpecker, or indeed of any other bird. Those warm, lowland, and (compared with the North and West of the country) dry regions to which it comes, abound with the minuter insects, especially with aphides and the smaller tribes of ants. These last are continually careering about on the boles and branches of the trees; and it is to them especially that the attention of the Wryneck is directed, so much so as to have merited and obtained the provincial name of the "Emmet-hunter." These ants the Wryneck catches with the tongue, an organ which it can protrude at least an inch, and retract again with the rapidity of lightning, so that when the ants are coursing about they are picked up, one by one, without the capture producing any alarm, or even being noticed by the rest. They are captured not only on the stems of trees, but on the ground, and they are even picked from their dens and hills, especially at those times when they are busy in bringing out the larvæ to the sun and air. Disturbing their dwelling readily brings out the ants at any time, if the weather is dry, and the Wryneck uses both its bill and the horny point of its tongue for that purpose; and when the little warriors mount the breach to reconnoitre and try if they can repel the enemy, the Wryneck picks them up, soldier after soldier, till none are left. When it is engaged over an abundant supply of its favourite food, whether on the trunk of a tree or on the ground, the body is motionless, but the head is continually moving from side to side, and the dark mesial line on the back twining like a serpent. At those times the motions of the tongue are so quick that they can hardly be observed. Indeed, the bird is altogether so shy and retiring in its habits, that it is difficult to be got sight of, unless one come softly upon it at those times when it is basking on or near the ant-hills, while the ants are taking their siesta, which most of them do, though at different times, according to the variety.—*Mudie*, "*The Feathered Tribes of the British Islands.*"

THE MINA AND THE CHOLERA.

A CURIOUS phenomenon has recently occurred at Mauritius, where that terrific scourge the cholera has been raging with desolating effect. There is a bird in that island called the Martin, but it is more properly the Mina. This bird is about the size of the starling, whose habits it possesses in a great degree. It exists in immense numbers, and is a grand destroyer of all insects. On this account it is seldom or ever shot at, especially as it is a great comforter to all cattle, whose hides it entirely clears from ticks and other vermin. During the prevalence of cholera at Mauritius, these birds disappeared. Such a circumstance had never before occurred, and the real cause of their departure is still a mystery. May it not have been that some species of insect on which they fed had likewise migrated, and that certain noxious animalcules which had been kept down by this class had thus multiplied in the atmosphere until their numbers caused disease? All suppositions on such a subject must, however, remain in obscurity, as no proof can be adduced of their correctness.—*S. W. Baker*, "*Wanderings in Ceylon.*"

ZOOLOGY.

Silvery Hair-tail.—I observed in the January number of Science-Gossip that a specimen of this fish had been taken uear Swanage in December. A fisherman of Durgan (ou the Helford harbour) brought to me on the 4th January that species of Trichiurus which he had caught in his net. It was quite new to the old experienced fisherman of the village. It was like a bar of silver, about two feet in length. I requested him to take it to a medical friend in Falmouth for his more complete examinatiou. This is the fifth specimen taken on the south-west coast withiu two months.—*C. F.*

Baby Hippopotamus. — At the meeting of the Zoological Society of Loudou, 21st February, the Secretary announced the birth of a young Hippopotamus iu the Society's Gardens, which had taken place that day, being the first occurreuce of this event in England, although this animal had previously bred in some of the Continental gardens. It died however within two days.

An Intelligent Cat.—At one of the principal railway stations iu Manchester, a tabby cat is often to be seen running about. She belongs to the refreshment-room, aud is very friendly with some of the lady travellers. One of these ladies always treats puss to a sponge-cake, and as soon as she has seated herself in the waiting-room, the cat jumps into her lap. In the course of her peregrinations, puss sometimes finds herself between the rails when a train is coming, and she then squats down until it has passed or come to a standstill.—*G. H. H.*

The Fiery-crested Wren (*Regulus igni-capillus*).—The discovery of this Regulus as a British bird is in itself rather a curious matter, as the honour of it belongs to a cat in the possession of a gentleman at Swaffham. Puss and her master are both fond of birds, though for different reasons no doubt; but puss studies her master's interest as well as her own, and affords another proof that the feline race are, by a little attention, fit for other purposes than mere mousing. Well, the cat in question is a very notable bird-catcher; at first, no doubt, for the supply of her own appetite; but her master and she now so well understand each other, that when she catches a bird she brings it to him. If it suits his purpose, she is fondled and fed; if not, the bird is returned to her, and she does with it as she likes. In that way she brought the fiery-crested wren to her master, a young bird, and just at the season when the young, if hatched in the country, would have begun to fly. That afforded a hint which was followed up. The old birds were observed in the neighbourhood, and very soon after they were observed near Brighton. — *Mudie*, "*The Feathered Tribes of the British Islands.*"

Parasites in the Interior of a Mole Flea.—In August last I caught a mole on the surface of the ground, which had become too hard for him easily to escape. As usual, he was infested with fleas to a very considerable extent. I secured a few for examination, and amongst them was one of an extraordinary size. Even without the aid of the microscope, it was easy to see that the abdomen was distended in an unnatural manner. After soaking in liquor potassæ, and squeezing it between two glasses prior to mounting, I was surprised to see large numbers of mites expelled from the abdomen; and after I had mounted it in balsam, I was pleased to find that seven mites still remained in the abdomen. I enclose a drawing of one, and should be glad to know whether any reader of Science-Gossip has met with a similar occurrence, and also how the presence of such a number of mites in the interior of the flea is to be accounted for.—*G. H. Stubington, Basingstoke.*

Pterodina valvata.—About the end of January I found *Actinophrys Eichornii* and *viridis* in abundance in a pool on the forest at Suaresbrook, together with other Rhizopods. While studying *Actinophrys*, I was agreeably surprised by seeing a pretty Brachionæan Rotifer swimming across the field of the microscope, and on closer examinatiou it proved to be a specimen of *Pterodina valvata*, described by Dr. Hudson in the January number of the *Monthly Microscopical Journal*, p. 25. Subsequent dips from my bottle produced other specimens, but I never managed to get more than one under the microscope at the same time. I am not sure that Dr. Hudson's figure (pl. lxxii.) is quite accurate as to the bosses round the margin of the loricæ. He represents five bosses on either side, and a median one in a line with the tail. In the specimens I examined on this point, I found six bosses on either side, and no median one, the line of the tail coming between two of the bosses. I have not, however, observed a sufficient number of specimens to speak positively. The number of the bosses may be variable.—*H. R.*

The Kestrel (*Falco tinnunculus*).—I have read with much pleasure the interesting account which "A. G. H." has given of his Kestrel in your last number, but I think he has made a mistake in attributing inaccuracy of description to three well-known and trusted writers on natural history. At page 63 he says, "Wood, Macgillivray, Mudie, and others describe the *iris* as yellow,—in her it is dark brown." Knowing that Macgillivray, especially, is famed for being one of the most scrupulously correct and careful of observers, I was of course somewhat surprised at his alleged failure in this instance. Happening to possess all three of the works referred to by "A. G. H.," I at once compared his statement

with those of the three authors. I give you the results:—Mudie, vol. i. p. 92, edition of 1834, says, "The eye of the Kestrel is peculiarly brilliant; the *irides* are rich brown, which contrasts well with the dark stripe and the pale feathers at the base of the bill and over the eye." Macgillivray, "British Birds," vol. iii. p. 327, edition of 1840, distinctly says, "*irides* hazel." Wood, "Illustrated Natural History," vol. ii. p. 82, edition of 1862, does not mention the *iris* at all; but he says, "the legs, toes, cere, and *orbits* of the eyes are yellow." It is never safe to quote from memory.—*J. T. H.*

Otters.—Two fine otters have been taken during the winter in this place, near the junction of the rivers Thames and Wey.—*Arthur R. Graham, Weybridge.*

"Eye-stones" (p. 21).—There is a very interesting notice on these objects in Humboldt's "Travels to the Equinoctial Regions of America" (Bohn's edition, i. 197), which I beg leave to copy:—"Of all the productions on the coasts of Araya, that which the people consider as the most extraordinary, or we may say the most marvellous, is 'the stone of the eyes' (*piedra de los ojos*). This calcareous substance is a frequent subject of conversation, being, according to the natural philosophy of the natives, both a stone and an animal. It is found in the sand, where it is motionless; but if placed on a polished surface, for instance on a pewter or earthen plate, it moves when excited by lemon-juice. If placed in the eye, the supposed animal turns on itself, and expels every other foreign substance that has been accidentally introduced. At the new salt-works, and at the village of Maniquarez, these *stones of the eyes* (they are found in the greatest abundance near Cape Araya) were offered to us by hundreds, and the natives were anxious to show us the experiment of the lemon-juice. They even wished to put sand in our eyes, in order that we might ourselves try the efficacy of the remedy. It was easy to see that the stones are thin and porous opercula, which have formed part of small univalve shells. Their diameter varies from one to four lines. One of their two surfaces is plane, and the other convex. These calcareous opercula effervesce with lemon-juice, and put themselves in motion in proportion as the carbonic acid is disengaged. By the effect of a similar reaction, loaves placed in an oven move sometimes on a horizontal plane,—a phenomenon that has given occasion, in Europe, to the popular prejudice of *enchanted ovens*. The *piedras de los ojos*, introduced in the eye, act like the small pearls, and different round grains employed by the American savages to increase the flowing of tears. These explanations were little to the taste of the inhabitants of Araya. Nature has the appearance of greatness to man in proportion as she is veiled in mystery; and the ignorant are prone to put faith in everything that borders on the marvellous." This information will certainly satisfy your correspondent's wish to learn more about *eye-stones*. I possess a great many specimens in my collections, and would gladly exchange them for English diatomaceæ, mounted and named. Messrs. Trübner & Co., 60, Paternoster Row, London, will forward letters to my address. —*A. Ernst, Caracas, Venezuela.*

Freshwater Molluscs.—"Laid up for the winter,"—*Anodonta cygnea*, which inhabits a small stream here, had buried itself deeply into the mud, leaving only the extreme posterior margin of its shell out, when I visited the rivulet on the 12th of last October. *Assiminea Grayana* has a habit of gathering together in great numbers around reeds, &c., on the surface of the muddy Thames banks. *Conovulus denticulatus* congregates in a similar manner at the approach of cold weather, but under stones, and such shelter as it can find on the river banks. *Clausilia laminata*, which abounds on chalky banks at Dartford, is fond of heaps of sticks and decayed *Clematis*, from which, however, it comes out in mild weather even in December and January, when I have taken it crawling. *Helix caperata* is active at intervals; during the winter a large proportion of the shells die. Dead shells were most numerous in a sample taken in January; and out of about a hundred *H. virgata*, taken at the same time for examination, there was only one living shell. The *H. virgata* had retired under the rubbish at the bottom of an old chalk-pit; near the dead shells were masses of eggs, apparently belonging to the species.—*Harry C. Leslie, Erith.*

The Mussel's Movement.—I remember having seen it stated in a work on natural history that the mussel has not the power of moving from place to place, and that it remains permanently fixed to the same spot. This, I believe, is the commonly received opinion, but it is an erroneous one; for, though the mussel does not often move, or to any great distance at a time, yet it certainly has the power of progression. To effect a movement, it extends its tongue-like foot to its utmost length; then, securing itself by pressing the end of the foot to the spot, it gradually draws itself forward, breaking, at the same time, the byssus by which it has formerly been attached. At every step it secures itself temporarily by new byssus, which it necessarily breaks at every move.—*A. E. Murray.*

Sea-birds in Manchester.—On the 14th February a sea-gull was shot in Peel Park, Salford. During the severe weather which prevailed about that time, several other sea-birds were noticed in the same neighbourhood, and also large flocks of the Fieldfare.—*G. H. H.*

Sea-Urchins.—When in Vancouver's Island last year, I happened to be at an Indian village, when a canoe was just being hauled on to the beach, filled with sea-urchins. It was at once surrounded by about a score of old men and women, who (notwithstanding the prickles) opened the shells easily with their bare hands, and greedily devoured the inside. I was invited to join them, and after filling my hands with the prickles, I succeeded in opening one; but the contents, though not positively disagreeable, were not suited to my fastidious stomach. This is the only occasion on which I have seen them eaten raw. But in the West Indies they are generally eaten as described by H. E. Watney; and, indeed, the common name there for them is *sea-eggs*. —*W. H. C.*

The Small Eggar (*Eriogaster lacustris*).—Imagos of this species emerged last month (February) from pupæ of the autumn of 1869. Normally they should have appeared in February, 1870, just a year before. A single male did emerge at that time. The pupæ have been kept in a cool place, yet one where I have always kept lepidoptera in their various stages, and have never, before this instance, found them abnormal in their emergence. Are not instances of such great retardation unusual?—*F. G. Binnie.*

Is the Landrail a Bird of Passage? (pp. 45, 70, and 71).—The Rev. Gilbert White, speaking of the landrail, which he describes as a rare bird at Selborne, says, "This is deemed a bird of passage by all the writers; yet, from its formation, seems to be poorly qualified for migration, for its wings are short, and placed so forward, and out of the centre of gravity, that it flies in a very heavy and embarrassed manner, with its legs hanging down; and can hardly be sprung a second time, as it runs very fast, and seems to depend more on the swiftness of its feet than on its flying." Mr. Markwick's observation on the above is as follows:—"That it is a bird of passage there can be little doubt, though Mr. White thinks it poorly qualified for migration, on account of the wings being short and not placed in the exact centre of gravity. How this may be I cannot say; but I know that its heavy, sluggish flight is not owing to its inability of flying faster, for I have seen it fly very swiftly, although, in general, its actions are sluggish. Its unwillingness to rise proceeds, I imagine, from its sluggish disposition and its great timidity; for it will sometimes squat so close to the ground as to suffer itself to be taken up by the hand rather than rise, and yet it will at times run very fast." Mr. Edward Jesse, the editor of Bohn's edition of the "Natural History of Selborne," appends the following foot-note on this subject:—"The landrail or corncrake is a bird of passage and a summer visitor to this country. When in the neighbourhood of Swansea, some years ago, I was assured by a gentleman residing near that place that he discovered in a field near the sea a large congregation of these birds. The next day not one was to be found." The Rev. J. G. Wood and the Rev. J. C. Atkinson also consider the landrail a bird of passage.—*G. H. H.*

The Periwinkle and its Shell.—Periwinkles have the power of remedying any injury that may happen to their shells. This I had an opportunity of observing from accidentally dropping one when placing it in the aquarium. By the accident a considerable portion of the fore upper edge of the shell was broken off, leaving a part of the animal bare and unprotected. Despite this misfortune, the mutilated mollusc was placed in the aquarium, and, in the course of a fortnight, it was evident that the creature was remedying the evil; and *now* (about six months after) the shell is again sound and perfect to the fore edge, the only difference being that there is a mark showing where the new piece has been added to the old. Doubtless other mollusks have the same power.—*A. E. Murray.*

Night-fliers in Brazil.—Huge moths, those fairies of the insect world, have now taken the places of the butterflies, and myriads of fireflies never weary in their torch-light dance. Far down the road comes on a blaze, steady, streaming like a meteor. It whizzes past, and for an instant the space is illumined, and dewy jewels from the leaves throw back the radiance. It is the Lantern-fly seeking what he himself knows best, by the fiery guide upon his head.—*Edwards*, "*Voyage up the Amazon.*"

White Ants.—The White Ants are a curse upon the country: although the hut is swept daily, and the galleries destroyed, they rebuild everything during the night, scaling the support to the roof and entering the thatch. Articles of leather or wool are the first devoured. The rapidity with which they repair their galleries is wonderful; all their work is carried on with cement: the earth is contained in their stomachs, and this being mixed with some glutinous matter, they deposit it as bees do their wax. Although the earth of this country, if tempered for house-building, will crumble in the rain, the hills of the White Ants remain solid and waterproof, owing to the glue in the cement. I have seen three varieties of White Ants, the largest about the size of a small wasp: this does not attack dwellings, but subsists upon fallen trees. The second variety is not so large: this species seldom enters buildings. The third is the greatest pest: this is the smallest, but thick and juicy; the earth is literally alive with them, nor is there one square foot of ground free from them in Latooka.—*Sir S. Baker*, "*Exploration of the Nile Sources.*"

BOTANY.

Absorption of Air by the Tissues of Plants.—In making certain investigations with respect to the growth and development of vegetable cells, I have once or twice come across a circumstance which I think deserves notice. It is a common thing to find air in the spiral and annular vessels of plants, which escapes from their open ends into the water surrounding the object under



Fig. 55.

the thin glass cover. But I have noticed a gradual absorption of this air, apparently into the tissues of the plant under observation. The absorption is so rapid that it may be readily observed. The two extremities of the air-bubble draw gradually nearer to one another, with a kind of dragging motion, until the air finally disappears. The air, I suppose, must be carbonic acid.—*J. S. Tute.*

Language of Flowers.—What is the earliest work which treats of flowers from the stand-point indicated by the above heading? Emblematic uses of flowers prevailed, undoubtedly, in very early times; possibly suggested the "lily-work" of the Temple (1 Kings vii. 22, and other passages); the lily being the emblem of purity and innocence.—*R. T., M.A.*

Gentian. — Linnæus records (*Flora Lappon.*, p. 64, ed. 1792), that a decoction from this bitter plant is sometimes employed with good effect in the case of country people suffering from intermittent fever, and that on this ground it had received the name of *Surge et ambula*. Is there any English equivalent to this in common use?—*R. T., M.A.*

The Chrysanthemum.—The Indian or Chinese chrysanthemum was introduced into this country as long back as the year 1764, Miller having received it from Nimpu, and cultivated it in the Botanic Garden at Chelsea, where it was probably lost, through some accident, as it is not mentioned in the first edition of Hortus Kewensis. — *Flora Historica.*

The Elm.—Is celebrated in the "Iliad" (book xxi.) for having formed a hasty bridge, over which Achilles escaped Xanthus, when that river, by its overflowing, had put him in danger of being carried away.—*Sylva Florifera.*

Veronica Buxbaumii.—This Buxbaum's Speedwell, which is described in Withering's "British Botany" as flowering from August to October, I found at Woolstone, near Southampton, with two full blooms on the 6th February, this year.—*Agnes Lury.*

Luminous Fungi.—Yes! some British plants and fungi are full of luminosity. The potato in a state of decomposition will give out a powerful light, and different species of Agaricus emit flashes of a phosphoric nature. I remember being a little puzzled, and, I confess with shame, not a little frightened, about five years ago in Hampshire. I had just made a new fernery at the lower end of my greenhouse. The decaying roots of some old trees had been used, and on looking through the glass door into the conservatory one night, just before locking the dining-room up, I saw some faint flashes of light. I mentioned the circumstance at breakfast next morning to some relatives who were staying with me, and got well laughed at—was asked if, as I was a Welsh woman, I did not fancy I had seen a "Canwyll Corph" (Corpse Candle), the light some of the South Wales country folk believe to proceed from any house where a death is shortly to take place. I was a little nervous, and next morning, when it was proposed we should go down from the drawing-room about nine o'clock to look for the "Canwyll Corph," fairly started back and screamed out with terror on seeing the powerful light plainly visible in the greenhouse. After a little jesting, one gentleman, who had been in California, admitted that he had been out all the morning seeking for phosphoric wood and plants in order to give me a fright. He had succeeded admirably, and I have good reason to remember luminous fungi. Some cryptogamic plants are luminous, — *Schistostega osmundacea* is; and, strange to relate, some human beings are. I know of one instance in England. I do not like to mention names, for the old lady is still alive, and a very dear good old lady she is; but she would be fearfully offended if any one hinted to her that the bright spots which occasionally appear on her were phosphorescent, and to be accounted for scientifically. She is eccentric, and is quite proud of these "tokens," as she calls them. She quite believes they are sent to her as warnings—that some one she knows will soon die; and as she lives in rather a large village, takes an interest in the poor, and knows every soul in the parish, it generally comes to pass that she does hear of a death after seeing "the token." I have often found it difficult to keep grave when she has said to me, "I saw the token again last night, some one will die shortly; you know Mary" (that is her daughter) "observed the spot on my face last week, the very day before poor James Carter sank." Certain insects are, we know, luminous, so are some living molluscs, polypes, crustaceans, and others. — *Helen E. Watney, Beaumaris.*

MICROSCOPY.

Bunt of Wheat as a Lens.—Most microscopists are familiar with an arrangement by means of which the eye of a beetle mounted in balsam, and placed on the stage of the microscope, a little out of focus, is made to show in each facet the image of a small object, such as a watch-key, placed between the slide and the source of light. The fungus *Tilletia caries*, commonly called the bunt of wheat, possesses similar optical properties when mounted in Canada balsam; and the sharp definition of the image proves that the spores of the fungus possess what opticians call "a good figure." It should be remarked that whilst the beetle's eye must be beyond the focus of the objective in order to show the image, a difference of refractive power in the bunt renders it necessary that it should be within the focus. As the spores are smaller than the lenses of the beetle's eye, a proportionately higher power is required to show the image.—*F. W. M.*

Hydra.—I had last summer a number of Hydras in a small aquarium with *Volvox globator*, &c. As the winter came on, they all disappeared, and for three months nothing was seen of the Hydras. I examined the water almost daily, from the time of their disappearance, with a Coddington lens, but nothing of them was to be seen until March 2nd, when I observed a small Hydra attached to a piece of *Anacharis alsinastrum* (which plant had been growing in the water the whole time), and now there are several of them, and increasing by gemmation, some of them having two buds at a time. I mention this, as I believe it is not often that the reproduction of the Hydra has been observed in the confinement of an aquarium. — *James Fullagar.*

Quekett Soiree.—The Soirée of the Quekett Microscopical Club was held on Friday evening, 17th March, by permission of the authorities at University College, Gower Street, and was not a whit behind any of its predecessors, either in interest or arrangement. The exertions of the Soirée Committee were rewarded by the presence of as large a company as the building could comfortably accommodate, and by the expressions of general satisfaction.

The Lung of a Frog.—At the last meeting of the Quekett Club, an American gentleman exhibited the lung of a living frog with the circulation going on, which attracted considerable attention during the evening. The method was explained by the exhibitor. This was one of the features only of a most interesting evening meeting.

NOTES AND QUERIES.

Field Club in South-Western London.—Can you tell me if there is any Naturalists' Field Club in existence in these South-western suburbs of London? I retain very pleasing recollections of excursions with the Liverpool Naturalists' Field Club in years past, and I have just been speaking with a friend who agrees with me in wishing that similar excursions could be organized in this neighbourhood. We should both be glad to know any who might have a like feeling with ourselves, and then, if there be no such society in existence already in this South-western District, we might possibly have a meeting with a view to the formation of a Field Club.—*W. H. Hatcher, Belmont, Battersea.*

Popular Errors (page 70).—It is commonly said that rats will not stay, and that horses will never be diseased, where a goat is kept. Is it the odour of the goat which is disagreeable to the rats? Odorous and bitter plants will, it is said, drive away bugs. Last winter a farmer I know kept a goat among some colts in a shed. One of the colts, a two-year old, had a tail which trailed on the ground. The goat, taking a liking to this particular tail, began one day and pulled the hair out, leaving it a complete stump. A great part of the hair was chewed and swallowed. The goat was not short of other food.—*George Roberts.*

The Song of Birds.—The purpose which the song of birds answers in the economy of Nature is one of those mysteries which, like the differences of tint in their plumage, human ingenuity has not yet been able to explain. It is not, however, a mere pairing cry, because it is continued until the birds break the shell, and in some instances until they are able to fly. We may be sure, however, that it has its use; and as we can observe that the females of all birds which have that cry, whether it be what we call song or not, are excited when it is uttered by the male; it may be that it produces in the female that heat which is necessary for hatching the eggs. In ourselves there are many sounds which make the heart beat, the blood dance, and the whole body glow, we know not why; and thus we have no ground for denying without proof that other animals may be affected in a similar manner. Perhaps the more philosophical way of considering it is to suppose that it produces general excitement, and a power of more energetic performance in all the labour which the birds can undertake. The connection between the song and the plumage, and the silence and the moult, is also a curious matter, and shows that the whole bird is subject to some general law, which, though it lies deep beyond the power of our divination, governs even the minutest circumstance, the production of a new spot or gloss on a feather, the reddening of a comb or a wattle, or the inspiration of courage into birds naturally timid.—*Mudie, "The Feathered Tribes of the British Islands."*

Gorgoniadæ.—Major Holland's suggestion that possibly, a few specimens of the living polypes might be picked up amongst the débris thrown up on our shores, is well worth the attention of your Cornish readers. Last summer, whilst on a tour in the north of that county, I found several of the

horny skeletons of *Gorgonia flabellum* on the beach near Boscastle; and happening to visit Tintagel after a heavy ground sea I found the shore literally strewed with them, in all states of preservation. In a few cases there were fragments of the cœnosarc still clinging to the sclerobasis, but I was not fortunate enough to find a living specimen. This fact would seem to point to the conclusion that they had been carried a considerable distance, and had suffered much buffeting in their passage. I may add that the local Cornish name is *Sea-thorn*.—*W. A. G., Richmond.*

Popular Errors.—It may interest "C. K. R." to know that in some parts of Kent there is an idea prevalent that upon the belly of the "deaf adder" may be traced the words:—

> "If I could hear as well as I can see,
> Neither man nor beast should pass by me."

The notion that the adder is deaf is by no means a modern one. We find it referred to in Psalm lviii. 4: "Like the deaf adder that stoppeth her ears."—*E. T. Cox.*

Eggs of Lepidoptera.—"G. H. B." will find a good deal of information on the subject of procuring and preserving these eggs in Dr. Knaggs's "Lepidopterist's Guide." I have procured several by breeding the females, many of which will lay freely in captivity. I do not know of any method of preparation by means of which the natural form and delicacy of the eggs can be rendered permament, but recommend their examination while fresh. —*R. Egerton.*

Opercula.—I have some opercula similar to those described by "J. W. K." (p. 69). They belong to the genus *Turbo;* but as I have not the shells, I have been unable to ascertain the species. —*R. Egerton*, 31, *Victoria Road, Kensington.*

Gizzard of Flea.—Among the interesting objects for the microscope for which we are indebted to the dexterity and the patience of the preparers, there is one of great beauty known as the "Gizzard of a Flea." Now as Monsieur Dujardin, in his work on the microscope, which, though of an old date, remains as yet unsurpassed by any modern book for the accuracy of its details, makes no mention of the flea's gizzard, I beg to invite one or more of your numerous readers to enrich the pages of Science-Gossip with a few particulars regarding the construction and use of the remarkable organ in question.—*C. G. Martens.*

Fossils of the Dolomitic Conglomerate.—Can you, or any of your readers, inform me whether any fossil mollusca have ever been found in the *Dolomitic conglomerate?* I can find no mention of such; hence I was both surprised and gratified at finding the other day, in that formation, near Frome, Somerset, ten species of mollusca, besides a small striated fish-tooth of the former; seven were Lamellibranchiata, including members of the genera Ostrea, Avicula, Lima, Pecten, and Modiola. There were also a small Gasteropod, and two Brachiopods—a Rhynconella, and a remarkable shell (Discina?) with a limpet-shaped upper valve, and a concave under valve with a deep recess towards the posterior part. The fossils altogether, though differing specifically from any others that I am acquainted with, are decidedly, I should say, of Mesozoic rather than of Palæozoic character. This would tend to confirm the present opinion with regard to the position of the *Dolomitic conglomerate*—viz., Triassic rather than Permian. It has been suggested that this formation is the representative in England of the missing Muschelkalk of Germany. The conglomerate is shown in the section near Frome, with diagrammatic distinctness resting unconformably upon the mountain limestone, while above it is overlaid conformably by the inferior oolite. Its thickness here varies from two to seven feet, and it consists of pebbles of the subjacent mountain limestone rounded by attrition, and cemented together by a light grey matrix of magnesian limestone, which by exposure becomes decomposed into a soft greenish-grey earthy matter. It is in two or three beds, each from one to two feet in thickness, parted by a thin stratum of black clay.—*H. F. Parson.*

A Turbid Aquarium (see Feb. No., p. 46).—Occasional opacity in an aquarium is, in many instances, caused by changes of temperature. Fine particles are separated from the water as the temperature falls, which, when it becomes water again, dissolve and disappear. But can the observer be absolutely certain that some portions of the mud are not agitated, and thus mixed with the water, through the agency of some of the creatures in the aquarium—if not by the fishes, possibly by the beetles? If he has there any beetles of size, it is possible they have caused the turbidity: those belonging to the genus *Dytiscus* I have repeatedly noticed have a great liking for a mud-bath. The presence of some moderate-sized pieces of charcoal would, it is likely, be of service where mud or soil forms part of the substratum. Sometimes, it is true, an aquarium will thrive for a good while with such substances contained in it; but the most successful experiments have been made with aquaria having only shingle or pebbles at the bottom. There are very few plants worth growing which actually require the nutriment described; those mentioned usually thrive on water only.—*W. R. H.*

Camphor *v.* Benzole.—How are we to preserve our insects? Hard work enough is it to secure them sometimes, and when we have them snug in our cabinets we naturally wish to preserve them from all parasites, and also to keep them in good condition. Mr. Newman and others condemn the use of camphor as inoperative in the case of certain enemies, and also as a cause of the appearance of greasiness in a cabinet. One is desirous of believing aught that comes from the lips or pens of those whose

> "Long experience doth attain
> To something like prophetic strain."

Yet, when we consider for how very many years camphor has been used as a preservative in cabinets and cases, it is not easy to convince ourselves that it is useless and even injurious. On one point, certainly, I am disposed to make a stand. The chemical composition of camphor is well known, and, if the drug be pure, as it generally is, not being notably adulterated, there is nothing in it to deposit grease on insects, paper, or wood. Its volatility is such, as all have noticed, that, when enclosed, it vaporizes away until none is left. Unless, then, it can be shown that the fumes of the camphor, impregnating the insects, do, by some decomposition they occasion, cause grease to be deposited, I cannot see how the camphor can be held guilty; and

this seems a not very probable supposition. Some *may* consider, as is asserted, that the odour of benzole is the more agreeable to the nose of the entomologist, though really such a preference would be singular; yet the most important is, which is the best preservative and the readiest to use? Rags dipped in benzole are not of very convenient application in many cases, and the odour passes off quickly if the compartment be not air-tight. Another thing is worth consideration: it has been stated that fibrous materials which have been damped with benzole, or similar preparations, do sometimes take fire spontaneously. A pleasant sight for an insect-hunter, on his return from a "mothing" sally, to behold his cabinets in a blaze. Would he bear it as philosophically as Newton did the destruction of his MSS. by "Diamond"? I trow not.—*J. R. S. C.*

A Tropical Forest.—If I rode with vasculum and insect-net and fowling-piece into the mountain woods, there was still the like pleasing uncertainty of what might occur, with the certainty of abundance. Soon a gorgeous butterfly rushes out of the gloom into the sunny glade, and is in a moment seen to be a novelty. Then comes the excitement of the pursuit, the disappointment of seeing it dance over a thicket out of sight, the joy of finding it reappear, the tantalizing trial of watching the lovely wings flapping just out of reach, the patient waiting for it to descend, the tiptoe approach as we see it settle on a flower, the breathless eagerness with which the net is poised, and the triumphant flush with which we contemplate the painted wings within the gauze, and the admiration with which we gaze on its loveliness when held in the trembling fingers. Next a glittering beetle is detected crawling on the grey bark of a lichen-tree; here is a fine caterpillar feeding yonder. By-and-by we emerge into a spot where, for some cause or other, insects seem to have specially congregated; a dozen different kinds of butterflies are flitting to and fro in bewildering profusion of beauty, and our collecting-box is half filled in the course of an hour.—*P. H. Gosse, "Romance of Natural History."*

The Earwig.—What is the true etymology of this name? We all know the tradition which tells how this insect creeps into men's ears, and works untold mischief in their brains,—a tradition which is as prevalent on the Continent as among ourselves; thus the animal is named *Perce oreille* (ear-piercer) in France, *Ohrwurm* (ear-worm) in Germany, *Pinzainola* (little piercer) in Italy, &c. Is our native name due to the same tradition? If so, what means the second syllable in it? But can it be that, after all, the name comes from quite a different source; that it is really "earwing"; and is derived from the shape of the insect's wing, which, when expanded, bears a certain resemblance to the human ear? Unlike the wings of most insects, which are generally elongate, this organ is, in the Forficulids, more or less circular, in its outline and traversed by numerous veinlets, disposed as in the Maiden-hair Fern (*Adiantum*), or as a fan. When at rest, the wing is folded lengthways; it is then again folded upon itself for about one-third of its length; and is thus comfortably packed under the very short elytra with which the creature is provided. The beautiful manner in which the wing is stowed away in its case suggested to Mr. Westwood the name of *Euplexoptera* (or insects with the well-folded wings), in lieu of Degeer's *Dermapters* (or leather-wings), a term having regard to the elytra, not to the true wings. The difficulty of unfolding the wing in order to get at its real form is not slight, as the elastic ribs resist every attempt to straighten them, and the membrane is exceedingly delicate and easily torn. Nevertheless its elegant shape, and the manner in which it is packed up, are well worth the trouble involved in the examination; whether the observer be thereby convinced of the appropriateness of the term "ear-wing," or not.—*W. W. Spicer, Potterne, Wilts.*

Insect Eggs.—I am afraid it would take much space to tell "G. H. B." where to find eggs of Lepidoptera, and then the when would be wanted, and, much more important than either, the practised eye of an entomologist would be required. Most entomologists will have a lot of eggs, in the course of a season, that they do not require for breeding purposes, and would no doubt be glad to distribute them. I shall be glad to do so, for one, and will be happy to hear from any microscopist requiring these interesting objects. I would also be glad to know how to prevent fertile eggs hatching, without injuring them for the microscope. Would immersion in hot water spoil them? Barren eggs shrivel up. Can this be prevented?—*John E. Robson.*

Is the Landrail a Bird of Passage?—I have a skin of this bird that was brought to me by a lad in December, 1868. He caught it in a cave on the rocks, and it was alive when I got it. I do not know the exact date, but it was a few days before Christmas day.—*John E. Robson.*

Cleaning Coral.—Could any of your readers kindly inform me how to clean coral? I have tried soap and water, but cannot succeed.—*W. H. M.*

Who Killed Cock Robin?—Without wishing to be understood as speaking "on authority," I may venture to state that it is very probable that our popular version of "Cock Robin," was written by Oliver Goldsmith. All who are familiar with the leading facts of his biography, know of his connection with Newbery, a bookseller and publisher, the predecessor of a still existing *juvenile* library in St. Paul's Churchyard; and will thus see the probability of his having produced many of our favourite nursery tales and ditties, which it may not have seemed to him desirable to acknowledge publicly.—*A. H.*

On the Broad (Science-Gossip, p. 50).—Is not the word *boulders* put for "bull-ders," *i.e.* the bull-rushes; large, strong, aquatic plants? The terminal is a common Saxon form, as in appul-der for an apple-tree; maple-der for a maple-tree. The pronunciation of boul, for bull, is not further out than that of *roud* for rudd; as quoted in the same paper.—*A. H., March* 13, 1871.

"The Story of a Boulder" in your January number, besides being very interesting, called to my mind the most remarkable collection of boulders I have ever seen in any part of the world, or indeed that I ever heard of. It is situated close to the summit of Mount Wellington, near Hobart Town, Tasmania; and I send you a short extract from my journal, though I don't know whether it will be of the least use to you, or to any of your readers. The

mountain is almost flat on the top, and the sides are (in the neighbourhood of the boulders) remarkably steep and precipitous, and from the peculiar formation of the bed of boulders, and the marked absence of any earth, gravel, or anything of a loose nature in the neighbourhood, I am at a loss to account for their formation, by the same process that produced your correspondent's; though, perhaps, if space permitted, I may be enlightened. "Nearly 4,000 feet above the sea-level, and close to the summit of the mountain, we come to what is called the *Ploughed Field*, which is a collection of boulders filling an immense natural basin or hollow, and altogether covering several acres. Each boulder is of several tons weight, the whole mass sloping upwards at a steep angle. The bottom or lower end of the field terminates abruptly in a precipice some hundreds of feet deep. How deep the boulders lie, goodness only knows; but the interstices between them look unutterably dark and dangerous, there being ample room for several people to slip down at once, into the black abyss below. We jumped, scrambled, and climbed from boulder to boulder, as best we could (taking good care not to slip), till safely across, when we found ourselves within a few feet of the flat summit of the mountain. One side of the *Ploughed Field* is bounded by a wall of tall rocks, in the shape of cylindrical pillars reared straight upright, some of which are quite 50 feet in height, and most of them are detached from those around, so that the whole presents an appearance

> 'Like a huge organ, formed by Nature's hand,
> To thunder forth her great Creator's praise.'

And so form a most imposing object."—*W. H. C.*

New Introductions.—I lately advocated in the pages of Science-Gossip the introduction into Great Britain of foreign insects remarkable for beauty or for peculiarity of structure, The following passage from Mr. P. H. Gosse's well-known "Introduction to Zoology" (vol. ii. p. 354) is so much to the point, that I cannot resist transcribing it. "We wonder that no one has tried to naturalize some of those splendid foreign butterflies which inhabit climates similar to our own, and whose caterpillars feed on plants which grow naturally in both localities; and there are many such, especially in North America; such as the beautiful *Papilio turnus* and *asterias*, the former of which feeds in the larva state on the willow and ash, and the latter on the parsnip and other umbelliferæ. Both of these are common, even so far north as Newfoundland. It might, doubtless, be easily effected by collecting the caterpillars in their own country, and allowing them to go into chrysalis, in which state they might be transported during the winter, and be evolved here in spring. We have had a specimen of *P. asterias* produced here from a chrysalis which we had brought from North America; and we have seen in the collection of Mr. Loddiges, a specimen of *Coronis*, a noble Brazilian species, which that gentleman informed us had been produced in his conservatory at Hackney, having been probably introduced in the earth of some imported plant. We see no reason indeed why the magnificent Lepidoptera, even of the tropics, might not be reared in our conservatories and stove-houses as readily as the palms and Orchideæ of the same regions. Whatever plant might be the food of the larva, it could surely be obtained in England in the present state of botanical science." We are scarcely, perhaps, prepared to appreciate fully the latter part of this sentence; nor can we yet hope to see hothouses in which may be reared the insect gems of Brazil or China, before whose glories the brightest flowers must "pale their ineffectual fires." But I am still of opinion, that, if the matter were taken up by a few energetic minds, we might yet see the *theory* of introduction converted into a reality, as there is no reason whatever why the many beautiful insects of North America and North Europe should not be established in our islands. At any rate, it is no slight encouragement to find the idea supported by so mature and world-renowned a naturalist as Mr. P. H. Gosse.—*W. W. Spicer, Potterne, Wilts.*

Cocoon of a hairy Caterpillar.—I imagine that the species referred to by Mr. Murray (p. 63), must be the well-known Tiger, *Arctia caja*. If so, there is no question that the hairs are purposely interwoven, as is, doubtless, also the case with other species which introduce their own hairs into the cocoon. Not all the species clothed with hairs render them thus available, but those doing so, are very careful, as may be noticed, so to commingle them with the silk as to render the abode more secure, and also the extremities of the hairs are carefully placed, so as not to annoy the chrysalis.—*J. R. S. C.*

"Eye-stones."—This name has been applied, as it appears, to several objects, similar in appearance, differing greatly in size and structure. As long back as 1763, Dr. Brookes described eye-stones, which he puts apart from mineral objects, showing eye-like markings, of the nature of agates or cornelians. Some were found, he says, in a quarry at Shot-over Hill, which were oval and of a reddish colour, containing a circle of white and a pupil, having rather the appearance of an eye darkened by a cataract. The size of these objects he does not state; it is probable that they were fossil shells. I think that though some concretions found in the heads of crustaceans may present this curious resemblance to the eye, the case is exceptional, and Mr. Izod is presumably right in assuming that his eye-stones are shells.—*J. R. S. C.*

The Crab and its Claws.—Every one must have observed that crabs have often one claw very much smaller than the rest, and doubtless have inferred that the crab has at some time or other lost the original claw, and that the small one has grown in the room of the missing member. This inference is certainly correct; but I fancy that very few know *when* the new member first makes its appearance, but suppose, as I did, that it began as an incipient claw, and gradually grew with its possessor's growth. From the following circumstance, I had an opportunity of knowing when a new claw first makes its appearance. One of my crabs (I believe from fighting, for they are very pugnacious) had the misfortune to lose one of his forceps claws, and thereby became greatly disabled from either offence or defence. In this mutilated state he remained for some time, taking, however, his food as if nothing was the matter, but looking as all crabs must look that have lost an efficient member. By-and-by the time came when he must cast his shell, and when he had accomplished this extraordinary feat, instead of appearing with only *one* forceps claw, he could now boast of *two*—one in the room of the one he had lost. It certainly was considerably less than the other, but still it was not an embryo, but a good, substantial, well-formed claw.—*A. E. Murray.*

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them. We do not undertake to return rejected manuscripts unless sufficient stamps are enclosed to cover the return postage. Neither can we promise to refer to or return any manuscript after one month from the date of its receipt. All microscopical drawings intended for publication should have annexed thereto the powers employed, or the extent of enlargement, indicated in diameters (thus: × 320 diameters). Communications intended for publication should be written on one side of the paper only, and all scientific names, and names of places and individuals, should be as legible as possible. Wherever scientific names or technicalities are employed, it is hoped that the common names will accompany them. Lists or tables are inadmissible under any circumstances. Those of the popular names of British plants and animals are retained and registered for publication when sufficiently complete for that purpose, in whatever form may then be decided upon. Address, No. 192, Piccadilly, London, W.

W. L. W. E.—The moss is *Hypnum rivulare*.—*R. B.*

W. J.—Your moss is *Hypnum riparium*.—*R. B.*

J. B.—Your specimen is a dwarf form of *Grimmia patens*.—*R. B.*

H. E. W.—*Ranunculus repens*, the commonest British species. We do not undertake to name specimens which the smallest amount of attention would enable any one to determine.—*J. B.*

E. H.—We have not read the work, but have heard it spoken of as a commendable compilation.

R. Cooke, Jun.—Your notice is quite out of order. You should have secured the address of "Microscope."

T. B.—A small specimen of *Peziza coccinea*.

W. W. S.—"The Journal of a Naturalist" was written by Knapp, and published by Murray. We know of no Botanical Exchange Club in London. The Botanical Society of Edinburgh, we believe, exchanges specimens.

H. B.—Oh yes, very common.

S. M. P.—Only a variety of *Vitis vinifera*.—*L.*

J. C.—Just what is wanted. We do not know of one that we could recommend.

H. S.—Only Stainton's "Tineina."

S. A. H.—We knew a "tabby" and a white cat do the same thing; therefore the argument fails. Pray do not write with such wretched ink: we could scarcely decipher your communication.

A. N.—Wonderful! Did you never discover that before? We thought it was known to every school-boy.

H. M.—We know of no text-book for Polyzoa.

R. G.—The specimens are *Hypnum piliferum* and *Plagiochila asplenioides*.—*R. B.*

R. V. T.—No. 1. *Hypnum serpens*. No. 2. *Squamaria lentigera*. This Lichen has only been recorded from two British stations, both south of Derbyshire. Can R. V. T. send more of it?—*R. B.*

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Hardy Orchids (established in pots) offered for other species.—W. H. Becby, 41, North End, Croydon.

Coleosporium petasitis.—For this micro-fungus send stamped envelope to J. R. Pocklington, Woolcott Park, Bristol.

Wanted, hairs of animals and insects for other material. Send lists to J. Needam, Jun., 27, Approach Road, Victoria Park.

Cardium Norvegicum, *Tapes aurea*, and *Tapes pullastra*, for shells of North or East Coast of England.—Miss Colson, Swanages, Dorset.

Slides of *Synaptæ inhærens*, polariscopic, and section of spine of *Echinus lividus*, for other good objects, Echinodermata preferred.—W. Swanston, 7, College Square East, Belfast.

Fine specimens of *Achatina zebra*, and other foreign land and fresh-water shells, for foreign ditto.—G. S. T., 58, Villa Road, Handsworth, Staffordshire.

For cuticles of Fern and Hyacinth (unmounted) send stamped address and object to C. H., 37, Devonshire Mews West, Portland Place, W.

For fossil Sharks' teeth (for cutting sections, &c.) send stamped addressed envelope, and any object of microscopical interest, to W. A. G., Parkshot, Richmond, Surrey.

Elephant's Tooth, pieces for sections will be sent on receipt of a slide of diatoms.—J. D. R., 93, Albion Road, Dalston, E.

Xenodochus Carbonarius wanted in exchange for mounted section of cuttle-bone, ferns or vegetable cuticles at option of sender.—H. P., 12, Margaret Street, Hull.

Spicules of *Gorgonia anceps* and others (named) for others, sponges preferred.—W. Freeman, 165, Maxey Road, Plumstead.

Would any one care to have bits of mosaic and marbles, from various ruins in Rome? Write immediately (inclosing stamp for *Italy*) to Mrs. K. T. G., care of the Editor.

Micro-fungi.—Various species (mounted in gum danmar) offered for other good slides. Send list to E. Ward, 38, Bradford Street, Coventry.

Toome Bridge earth, or sections of Echinus spines (unmounted) for mounted polariscope objects.—Robert T. Andrews, Castle Street, Hertford, Herts.

Barbadoes earth and Tripoli earth wanted. What will be taken in exchange, or what is the price?—W. L. Nash, Stroud, Gloucestershire.

Horse Hoof.—Trans. and long. (handsome polarizers) for other objects, polarizing preferred.—C. D., 187, Oxford Street, Mile End, E.

I will give 24 slides of various and authentic species of Diatomaceæ, for the same number of insect, botanical, or polariscope preparations.—B. Taylor, Hon. Sec. Whitehaven Scientific As.

BOOKS RECEIVED.

"The Journal of Applied Science," for March.

"Monthly Microscopical Journal," for March.

"Land and Water." Nos. 266, 267.

"Winchester and Hampshire Scientific and Literary Society's Annual Report for 1870."

"Chemical News." No. 588. March 3, 1871.

"The Canadian Entomologist." Sept. and Oct.

"The American Naturalist." February, 1871.

"The Gardener's Magazine." March, 1871.

"The Animal World." March, 1871.

"Notes on Chalcidiæ." By Francis Walker. London: E. W. Janson.

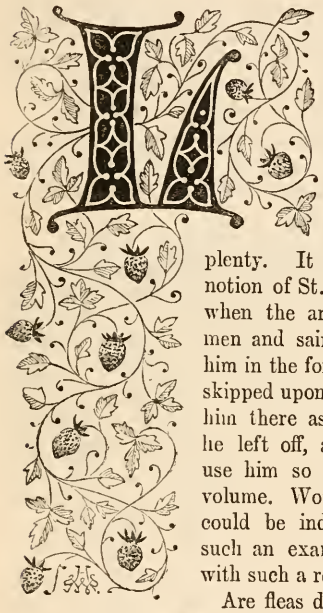
"The Colliery Guardian." No. 532. March 10, 1871.

"Boston Journal of Chemistry." March, 1871.

Communications Received.—T. B.—H. E. W.—E. R. F.—R. E.—A. C. C.—E. H.—T. C. I.—C. F.—J. B.—A. E.—J. S. T.—W. H. C.—A. A., Jun.—R. C.—H. P.—R. T., *M.A.*—J. H.—J. R. P.—W. H. B.—G. H. S.—J. S. T.—T. C. I.—E. B. F.—J. R. S. C.—W. W. S.—W. F.—C. H.—H. P.—A. H.—J. D. R.—W. A. G.—W. H. M.—H. S.—A. N.—E. J. C.—G. S. T.—F. T.—R. V. T.—W. S.—C. G. M.—J. E. R.—S. A. H.—C. J. W. R.—H. E. W.—Miss C.—T. B.—S. R.—C. V.—J. C.—W. A. G.—R. G.—F. G. B.—G. H. H.—W. H. C.—J. C.—J. N.—H. F. P.—H. B.—S. M. P.—H. G.—B. T.—R. T. A.—E. W.—J. F.—G. R.—C. J. D.—E. S.—J. E. M.—C. V.—W. L. N.—K. T. G.

FLEAS, FLEAS!

"Dear miss, don't you like fleas! Well, I think they are the prettiest little merry things in the world. I never saw a dull flea in all my life."—*Kirby and Spence.*



IVELY! yes, they are lively creatures, are those fleas, and if the month of March does not bring us spring, it brings us "springers" in plenty. It was not a bad notion of St. Domingo, who, when the arch-tormentor of men and saints appeared to him in the form of a flea, and skipped upon his book, to fix him there as a mark where he left off, and continue to use him so throughout the volume. Would that all fleas could be induced to follow such an example, and meet with such a reward.

Are fleas degenerated flies, who have lost their wings and taken to their legs? It is the opinion of entomologists, at least some of them, that fleas are very nearly related to the Diptera; but as for degeneration, or progression, upwards or downwards, in this developmental age, we are at times almost staggered, not only at fleas, but something higher in the scale of creation than these, that were once, if dreams become true, even lower than fleas in the circle of life. Men, flies, fleas, Bathybius, through myriads of ages struggling upwards. By the same token may they not slide back, man, monkey, monse, mollusc, to the monad again?

Whence came the fleas? Or, using the language of the evolutionists, through what chain of being can we trace the flea to its origin, until we find its primogenitors stopping a bunghole? Some trace the descent of fleas from a remote and very unsavoury origin, but we will rest content with a more romantic legend.

Amongst the Kurds a tradition is preserved that when Noah's ark sprang a leak by striking against a rock in the vicinity of Mount Sindshar, and Noah despaired altogether of safety, the serpent promised to help him out of his mishap if he would engage to feed him upon human flesh after the deluge had subsided. Noah pledged himself to do so, and the serpent coiling himself up, drove his body into the fracture, and stopped the leak. When the pluvious element was appeased, and all were making their way out of the ark, the serpent insisted upon the fulfilment of the pledge he had received; but Noah, by Gabriel's advice, committed the pledge to the flames, and scattering its ashes in the air, there arose out of them fleas, flies, lice, bugs, and all such sort of vermin as prey upon human blood, and after this fashion was Noah's pledge redeemed.

So much for the tradition of the Kurds; but lest it should be supposed that this is the only fragment we possess of the prehistoric times of fleas, we will furnish another from the Sandwich Islands, according to which, "Many years ago, a woman from Waimea went out to a ship to see her lover, and as she was about to return, he gave her a bottle, saying that there was very little valuable property contained in it, but that she must not open it, on any account, until she reached the shore. As soon as she gained the beach, she eagerly uncorked the bottle to examine her treasure, but nothing was to be discovered,—the fleas hopped out, and they have gone on hopping and biting ever since."

This will perhaps be sufficient to prove that even fleas have an early history, extending backwards into rather dark ages. These pigmy tormentors are better known than respected, all the world over, and in the East especially hold terrible power over the repose of the inhabitants. It is said that the king of fleas holds his court at Tiberias, and certainly Levantine habitations are their delight.

A principal city in Ionia was once abandoned on account of the fleas. In Purchas's "Pilgrims" we read that the Jews were not permitted to burn fleas in the flame of their lamps on the Sabbath. It is therefore probable that they did so to a considerable extent on the other six days of the week. On one occasion, Iwan Vasilowich sent to the city of Moscow to provide for him a measure full of fleas for a medicine. The inhabitants answered that it was impossible, and if they could get them, yet they could not measure them because of their leaping out. Upon this the city was mulcted of seven thousand roubles,—an early example of "requisitions."

Performing fleas have also had their history written, for Mr. Frank Buckland, in the third series of his amusing "Curiosities of Natural History," devotes a chapter to the subject. Both before and since chroniclers have been found for the marvels of flea-life. Purchas states that an Egyptian artisan received a garment of cloth of gold for binding a flea in a chain. Time and space forbid our entering upon the details of fleas in harness.

It is generally admitted that, however clever fleas may be, they are at best sorry companions, and therefore willing ears will be turned towards him who will declare methods for their sure and certain expatriation. Before attempting this we will call to the remembrance of our readers poor Humphrey's pleasantry on this point. "A notable projector became notable by one project only, which was a certain specific for the killing of fleas, and it was in form of a powder, and sold in papers, with plain directions for use, as followeth: the flea was to be held conveniently between the thumb and finger of the left hand, and to the end of the trunk or proboscis, which protrudeth in the flea, somewhat as the elephant's doth, a very small quantity of the powder was to be put from between the thumb and finger of the right hand. And the deviser undertook, if any flea to whom his powder was so administered should prove to have afterwards bitten a purchaser who used it, then that purchaser should have another paper of the said powder gratis. And it chanced that the first paper thereof was bought idly, as it were, by an old woman; and she, without meaning to injure the inventor or his remedy, but of her mere harmlessness, did innocently ask him whether, when she had caught the flea, and after she had got it, as before described, if she should kill it with her nail it would not be as well. Whereupon the ingenious inventor was so astonished by the question, that, not knowing what to answer on the sudden occasion, he said with truth to this effect, that without doubt her way would do too." And according to the belief of poor Humphrey, there is not yet any device more certain or better for destroying a flea, when thou hast captured him, than the ancient manner of the old woman's, or instead thereof, the drowning of him in fair water, if thou hast it by thee at the time.

Even as long ago as the time of Pliny fleas were but too plentiful, and men sought anxiously for charms and remedies to abate their annoyance. One of these is given by Pliny to the following effect. "If a man, the first time that he heareth the cuckoo, presently stay his right foot in the very place where it was when he heard her, and withal mark out the point and just proportion of the said foot upon the ground as it stood, and then dig up the earth under it within the said compass, look what chamber or room of the house is strewed with the said mould, there will no fleas breed there." There is some consolation even in the hope of such a remedy proving effectual, notwithstanding that it is contingent upon the note of the cuckoo. A more amusing mode is that attributed to a sporting Queen of Sweden, for in the arsenal at Stockholm is exhibited a miniature piece of ordnance four or five inches in length, with which, report says, on the authority of Linnæus, that Queen Christiana used to cannonade fleas.

Various plants, under the name of "Fleabane," have obtained a reputation for the destruction of fleas. One of these is alluded to by old Tusser in the following lines:—

> "While wormwood hath seed, get a handfull or twaine,
> To save against March, to make flea to refraine:
> Where chambere is sweeped, and wormwood is strown,
> No flea for his life dare abide to be known."

In Dalecarlia the inhabitants place the skins of hares in their apartments, in which the fleas take refuge, so that they are easily destroyed by the immersion of the skin in scalding water. Recently Mr. B. T. Lowne has recommended a little chloroform to be placed on sponge or cotton wool and laid in the bed where fleas delight to congregate, inasmuch as it appears to be a medicament for which they are by no means partial.

We have written very little indeed, as yet, of the scientific history of the flea; nor is it our intention to dilate upon that phase of the subject. At a meeting of the Quekett Microscopical Club in February last, a very interesting paper was read by Mr. Furlonge on some points in the anatomy of the common bed-flea (*Pulex irritans*) which provoked a rather animated discussion. For that kind of information we must refer to the paper itself when published in the journal of the Club. Some persons suppose that there is but one kind or species of flea, found on man and all the inferior animals, whereas there are numerous species, and of these we shall enumerate a few.

First, and foremost, there is the Human Flea (*Pulex irritans*), which annoys sensitive humanity, and is much better known than respected. It is principally of these that Mouffet writes in his "Theatre of Insects," when he says, "The lesser, leaner, and younger they are the sharper they bite,

the fat ones being more inclined to tickle and play; and these are not the least plague, especially when in greater numbers, since they molest men that are sleeping, and trouble wearied and sick persons, from whom they escape by skipping; for as soon as they find they are arraigned to die, and feel the finger coming, on a sudden they are gone, and leap here and there, and so escape the danger; but so soon as day breaks they forsake the bed. They then creep into the rough blankets or hide themselves in rushes and dust, lying in ambush for pigeons, hens, and other birds; also for men and dogs, moles and mice, and vex such as pass by."

There is some speculation, without truth, in the latter part of this paragraph; for the flea that annoys mankind is quite distinct from the bird flea, those of cats and dogs, moles and mice, and others. Whether true or false we cannot say, but it has been affirmed that asses are never troubled with fleas, and that it is consequent upon our Saviour riding upon one of these animals.

The Cat Flea (*Pulex felis*) has already been noticed by Mr. McIntire in an early volume of this journal.

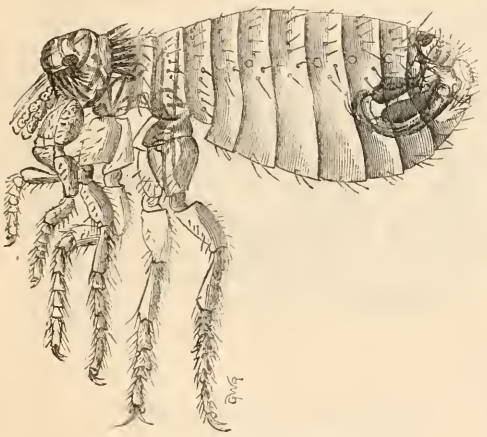


Fig. 56. Dog Flea (*Pulex canis*), male.

The Dog Flea (*Pulex canis*) is also different from both. Whether it is the same that occurs on the fox, we are unable to say. Mouffet alludes to this last in the following manner:—"The fox gathers some handfuls of wool from thorns and hedges, and wrapping it up, he holds it fast in his mouth, then goes by degrees into a cold river, and dipping himself close by little and little, when he finds that all the fleas are crept so high as his head for fear of drowning, and so for shelter crept into the wool, he barks and spits out the wool full of fleas, and so very froliquely being delivered from their molestations, he swims to land." We have always been ready to accord to the fox a considerable amount of cunning, but not quite so much as our author is inclined to do.

The little Mole Flea (*Pulex talpæ*) is an interesting and not at all uncommon species. Some say that it is blind, and so it was stated of the mole, until the contrary was proved.



Fig. 57. Mole Flea (*Pulex talpæ*), male.

Three species of flea are found on bats. One is called *Pulex elongata*, another the Three-banded Flea (*Pulex trifasciatus*), and the third is *Pulex vespertilionis*. For further particulars of these we must refer our readers to Curtis's "British Entomology."

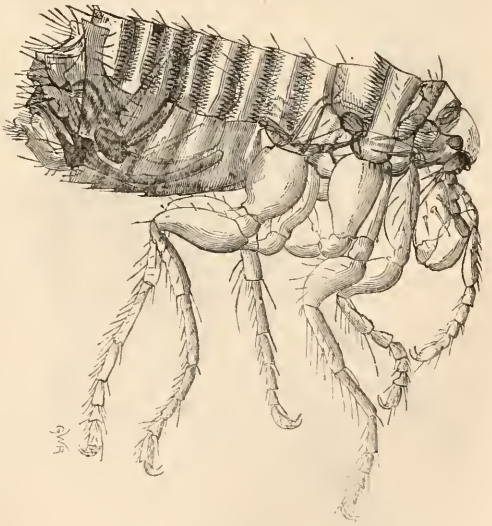


Fig. 58. Bat Flea (*Pulex vespertilionis*), male.

The Squirrel Flea (*Pulex sciurorum*) is not uncommon in this country; but whether the *Pulex martis* has been found on the weasel or stoat, we cannot say.

The rat has two kinds of fleas, that is, the banded Rat Flea (*Pulex fasciatus*), and the common Rat

Flea (*Pulex muris*). A pretty little flea (*Pulex musculi*) is found on the mouse.

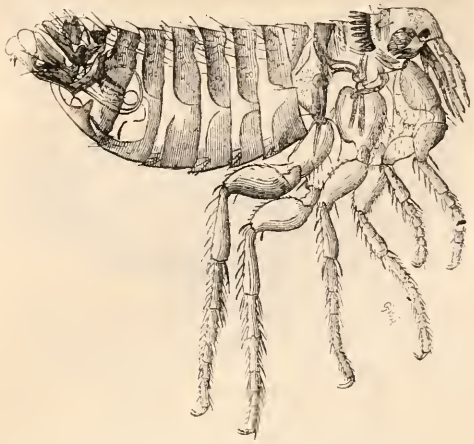


Fig. 59. Squirrel Flea (*Pulex sciurorum*), male.

Besides these there are the Hedgehog Flea (*Pulex erinacei*) and the flea of the hare (*Pulex leporis*). There may be others found on our native mammals; but these, at least, seem to be good and distinct species.

In addition we may mention those found upon birds. The Bird Flea is occasionally spoken of as though there were but one, nevertheless the Swallow Flea (*Pulex hirundinis*), the Martin Flea (*Pulex bifasciatus*), the Starling Flea (*Pulex sturni*), the Pigeon Flea (*Pulex columbæ*), and the flea of the barn-door fowl (*Pulex gallinæ*), are all regarded as good species.



Fig. 60. Bird Flea, male.

This enumeration, barren as it is, may be of service as indicating the known species found in these islands, and may lead some of our readers to look out for fleas on domestic and wild animals with the assurance that they are not all alike.

There is one other flea, fortunately *not* a British species, which we have designedly left to the last. This is the Chigoe or Jigger (*Pulex penetrans*) of South America and the West Indies. According to Stedman, this is a kind of small sand-flea, which gets in between the skin and flesh without being felt, and generally under the nails of the toes, where, while it feeds, it keeps growing till it becomes of the size of a pea, causing no further pain than a disagreeable itching. In process of time, its operation appears in the form of a small bladder, in which are deposited thousands of eggs or nits, and which, if it breaks, produce so many young chigoes, which, in course of time, create running ulcers, often of very dangerous consequence to the patient. Southey says that many of the first settlers in Brazil, before they knew how to extract the chigoes, lost their feet in the most dreadful manner.



Fig. 61. Chigoe (*Pulex penetrans*).

Burton, in his "Highlands of the Brazils," furnishes us with something more concerning them. "The jigger, seen under the microscope, has the appearance of a small flea with well-developed body, and of somewhat lighter colour. It crawls more quickly, but does not jump so well as the ordinary pulex. The popular belief is that the male is never found. It burrows under the nails of the hands and feet, especially the latter; I have extracted as many as six in one day, but never from the fingers. The sole is also a favourite place; in fact, the insect colonizes wherever the skin is thick: hence its preference for negroes. Its proper habitat is between the cuticle and the flesh, into which it does not penetrate; and where there is not lodging room, it falls off after drawing blood.

Having ensconced itself bodily, the jigger proceeds to increase and multiply; the small dark point develops to the size of a pea, and can move no more. The light-coloured bag is enormously distended with eggs of a slight yellow tint, and after producing her fine family, the parent departs this life.

"The small livid point, which appears about the nails, is generally accompanied by a certain amount of titillation, which old stagers enjoy; they describe it as *sui generis*, and make it almost deserve the name of a new pleasure. Men with tender skins easily feel the bite, and remove the biter before it can penetrate. They then send for a negro, always the best practitioner, and he proceeds to extract the intruder with a pin, in preference to a needle. Should the sac be burst, and the fragments not be all extracted, the place festers, and a bad sore is the result. Some sufferers have had to wear slippers, and have walked lame for weeks. The wound is finally cicatrized with some light alkali,—even snuff and cigar ashes are used, and a little arnica completes the cure."

And now, for the present, we take our leave of the fleas. A little running gossip on some of the romance of the subject may serve to put us in better humour for such of the realities as it may be our fortune to experience. It by no means follows that we are disposed to accept all the romance as fact, but it will not be difficult for each to eliminate for himself the real from the ideal. Since the attention of microscopists is likely to be directed more than hitherto to these lively little creatures, such an episode as the present will not be altogether out of place. Mr. Furlonge's paper, and Mr. Lowne's animadversions, are enough to convince us that there is somewhat more to be learnt about such a common object as a Flea.

A RAMBLE BY THE SEA-SHORE.

> "Ocean of wonders! could I pierce thy depths,
> And dive into thy dark and azure breast,
> Below, below, far, far, and far below,
> Amid shells, seaweed, and cerulean gleams,
> What sights should I behold!"

BUT "A Ramble by the Sea-shore" is the subject given, and not a dive beneath its green billows, into Ocean's richly-jewelled caverns; therefore I must confine myself to a description of some of the varied objects of interest which are to be met with along the coast, and commence with the lowest order of all bearing an appearance of animal life, gradually proceeding to furnish, as well as the limits of this article will permit me to do so, an account of a few of the higher forms, found on the beach between high and low-water mark.

The very lowest grade of animal life, *Protozoa*, are so closely allied to the vegetable, that it becomes a difficult point in some cases to decide to which kingdom the object belongs. The common sponge is a member of the Protozoa family, and although the sponge of commerce comes from the rocks of the Mediterranean, there are some sixty odd distinct species met with in the streams and on the shores of our native land. Witness the yellow fungus-like substances we find on the rocks which are left bare by the receding tide, such as the "Crumb of Bread" Sponge, and others.

Should these "cradles of organic life" have escaped the attention of the ordinary rambler by the sea-shore, the sponge we are in the habit of using must be familiar to all, though all may not know that the nice soft article they wash with is the skeleton of what was once a real living creature.

Living sponges possess the power of continuous action. Take a live specimen, and watch it carefully, and you will very soon see that a constant current of water flows at the will of the animal through its ducts. It has two sets of ducts, or canals; one for receiving the fluid into its interior, the other for discharging it; thus affording evidence of a most perfect system of circulation, and so demonstrating the presence of a vital principle.

Many people will argue that a sponge does not evince the power of sensation. Tear it open, burn it with red-hot irons, and it will not, I grant you, show a trace of feeling; nevertheless, the smell of ammonia given out by burnt sponge betrays its animal nature.

The curious way in which sponges reproduce their young is remarkable. You will see, at certain seasons of the year, small yellow granules fixed in the ducts of the sponge, as these grow larger they get freed from their slimy bed, and are directly carried off by the flowing current of water, each young sponge being provided with a set of thread-like appendages, which are wisely intended to serve a double purpose. They act in the first place as oars, by means of which the small fry move about until they meet with a suitable resting-place, and then they make good anchors.

Immediately the juvenile sponge finds a desirable rock, it fastens itself on to it by means of these threads, and an adhesive substance which it throws out, and then, having no further use for its *cilia*, quietly absorbs them; for the sponge, unlike most seaside visitors, never changes its lodgings. It stops in the place it first selects, and quickly establishes a home of its own.

We should not fail to notice how, in the structure and history of so insignificant an atom as the sponge, our all-wise Creator has displayed his providential care by gifting such helpless little animals with the power of locomotion at the exact time they need it; a power cut off from the adult sponge as soon as its aid is no longer required.

From sponges we come to sea-flowers—"Sea Anemones," as they are generally called. They belong to the next order in the ascending scale—the *Radiata*, and some of them are exceedingly beautiful.

A great many of these sensitive plants of the sea-shore must be perfectly familiar to the majority of seaside visitors; in fact, now, aquariums having become so very general, and artificial sea-water so easy (thanks to chemistry) of production, there are but few of the inhabitants of our inland towns who do not know such Zoophytes as the *Actinia coriacea* (Sea-nettle) and the *Bunodes crassicornis*, or "Thick-horned Anemone," perfectly well.

Several kinds are to be met with on the rocks along the coast: the island of Anglesea is rich in lovely specimens, whose brilliant colours are as varied as their forms. Others affect deep pools, shaded by rocky ledges, or protected by fringes of seaweed; and although they always fix themselves in the shade, they like a spot where, by extending their tentacles, or feelers, they can obtain a ray of sunshine. Their brightest hues are exhibited to the god of day. Notice a Sea-anemone kept in a glass aquarium; if the day be dull, there will only be a soft little lump of coloured jelly visible; but directly the sun puts in an appearance, you will find an expanded disk, presenting a perfect resemblance of a living flower, such as a Marigold or China Aster, in your globe.

The casual observer wandering on the sea-shore would, probably, consider these Zoophytes very uninteresting animals; but they evince a good deal of instinct, when self-preservation is the object they have in view. One sort gives out, when touched, a most offensive odour; another, when located on rocks, or stones close to the shore, covers itself with shells and gravel, in order to avoid detection—more instances of God's protecting care for the meanest of his creatures.

Having kept all kinds of Sea-anemones for years, I have had considerable opportunity of studying their habits. They have but very slow powers of locomotion, and very good digestion. Their voracity is wonderful. A Crass, I now have, swallowed a large crab, quite as big as himself, the day after I placed him in his glass-house; sucked all the meat, and then disgorged the shell. They make no difficulty whatever of taking a sea-urchin, spines and all, for breakfast, and were it not for a certain power of attraction in their long feelers, they would often, as they are so slow of motion, be on "short commons"; but these tentacles of theirs seize all the small molluscs that come in their way, then curl over, and convey the dainty morsel to the Anemone's mouth, an orifice in the centre of the disk, to be ejected by the same aperture directly all the good has been extracted.

There are Sea-carnations and Sea-daisies to be found on our coast, also a variety which, evidently being fond of wandering, fixes itself on the shell of a crab, and thus gets carried about to see the world. It is known as the Parasite Anemone.

Corallineæ should come next. Crabbe wrote of this tribe,—

> "Involved in sea-wrack here you find a race
> Which science doubting, knows not where to place."

Science, however, has, since the time of the poet, discovered its rightful position, and we have but to look at the coral of the tropical seas, and the vast reefs of Australia, to understand how great a part these same coral tribes have played, since creation began, in the formation of different continents. Still as there are but very few species of Corallines in the British seas, I shall pass over to the next order of *Radiated polypes*, some of which the rambler by the sea-shore is sure of meeting with on our native coast. I allude to Jelly-fish; and fortunate it is for us that the more stinging species, the Medusa, are not very common here, since they have the power of inflicting great pain on any miserable individual who comes within reach of their trailing, riband-like arms.

One strange fact connected with the Jelly-fish is, that it has the power of breaking off its arms at will; so, directly that a bather gets entangled in the coils of this Sea-nettle, the angry fish dismembers itself, leaving its tendrils clinging to the writhing mortal, who, struggle as he may, still suffers, since the severed members possess the power of inflicting acute pain.

Few, who merely see these far from agreeable-looking lumps of gelatine, called Sea-blubbers, which are cast up by the waves on the beach, could possibly imagine the beauty of form and brilliant colouring displayed by some of the species, when carefully examined in their native element. Many of them are likewise capable of emitting a bright phosphorescent light by night, which is quite as beautiful, in its way, as the varied iridescence exhibited by them when the sun shines.

Those pretty little members of the class *Echinodermata* (Sea-hedgehogs) and Starfish are among the most "common objects" of our sea-shore They are to be met with everywhere along the coast, and will well repay the lover of natural history for the trouble in studying their formation and habits.

Starfish are, as Professor Forbes quaintly observes, "endowed with the power of indulging in sudden suicide." Some of the species when captured fall to pieces, and the various transformations which the embryo of a Starfish goes through before it attains maturity are very wonderful. I regret that space will not permit me to dwell upon them here; but I must describe the mode in which the "fine finger" insinuates himself into the oyster. It

turns its own stomach inside out, in the form of a lobe, and this lobe has such pliable properties, that when the unsuspecting oyster opens just a wee portion of its shell, the sly Starfish pokes his stomach in, and skilfully manages to extract all the succulent portion of the animal. The handsomest of the Starfishes found on our coast is the "Sun-star." It is found on oyster-beds and scallop-banks. The "Purple-tipped Sea-urchin" and the "Common Urchin" are the most generally known of the British species. The latter are eaten abroad, and are said to be remarkably palatable. Judging from the avidity with which Crass seize and devour Sea-urchins, one would imagine the fame of their savour well deserved; that is supposing the taste of Crass and human beings to approximate. Anyhow, the Sea-urchin's relation, the Sea-slug, is considered a delicacy by the Celestials. However, the Chinese are known to possess queer notions about culinary matters, so that their verdict cannot be relied on. Unfortunately, most unfortunately, the siege of Paris has given the poor Parisians ample opportunity of tasting and testing some of the articles of food used in China —such as dogs, cats, and rats.

Now I come to a higher order of marine animals, old acquaintance doubtless of my readers, *Crustaceans*, comprising Prawns, Shrimps, Crabs, and Lobsters, not forgetting the well-known Barnacle, and the Sea-acorn.

It was not my object when I began this article to include in it any animal that could not be met with by the sea-shore pedestrian; therefore as the edible Crab and Lobster are mostly table friends, I shall dismiss them at once, but the various Crabs we find under the seaweed-fringed rocks, or buried in the soft sand, demand a longer notice. First of all there is the brave little Velvet Crab with its bright coat of brown and blue, and the Hermit Crab, that singular creature, which, not having been provided by nature with an armour of its own, seeks a coat of mail for its hinder extremities in the empty shell of a whelk. Some evil-disposed naturalists have slandered the poor hermit of the ocean, by asserting that it first kills the rightful owner, eats him up, and then takes possession of his property; but this fact is *not proven*. Fishermen call the hermits "wigs." The Angular Crab is found on the Welsh coast, and the Spider Crab off Dorsetshire and North Wales, and the other species of the tribe; and a very extensive tribe it is too, far beyond the limits of an ordinary article like this, otherwise much might be written of interest respecting the different kinds peculiar to our own shores.

Molluscs, also, I must unwillingly set aside, although the shells of some are so beautiful, both in colour as well as structure, that it would be a real pleasure to describe them; for the true lover of natural history finds (next to the enjoyment of collecting specimens) most satisfaction in writing about them for the amusement of others; and if I have succeeded in affording pleasure to even one fellow mortal, who like myself appreciates a walk on the beach, not simply for the sake of benefiting by the health-giving sea-breezes, but on account of the opportunity it affords us of acquiring a greater insight into the works of Him who formed the glorious scene, and framed a scale of being, each holding an important rank or link in the vast chain of creation, I shall feel amply repaid for my labour in writing "A Ramble by the Sea-shore."

> "Oh Nature, how I love thee! how my soul
> Delights to gaze on thy resplendent form,
> Till like Pygmalion, raptured by the sight,
> And passionately fond, God gives thee life
> In every feature. And thou art not matter,
> But vital essence. In thy streams and hills,
> And vales and mountains, trees and herbs and flowers,
> And all the living creatures that they hold,
> I see and feel the active soul of heaven."

H. E. Watney.

TI.

TI was a pet squirrel, whose history is now about to be written. In the spring of 1870 a party of workmen, who were employed in the neighbourhood of "glorious Goodwood," captured fifteen or sixteen young squirrels (*Sciurus vulgaris*), some of which had scarcely opened their eyes to the joys of their home in the "High wood." The smallest of the batch was presented to my hopeful son and heir, who entered with alacrity into the project of rearing and civilizing this "babe of the wood." When we first made his acquaintance he was a little sandy urchin, not larger than a mouse, and his tail was a tail, but it was nothing more. There was the long thin tapering central axis which in due time would, it was hoped, become a brush; but that graceful appendage, the glory, and doubtless the pride of all squirrels, was, at this very elementary stage of development, represented by two rows of soft silky hairs, branching off at right angles from the opposite sides of the axis. Its abdomen was white, but not spotless. A number of suspicious-looking black pustules were scattered about it. Investigation proved them to be fleas, and fleas too that seemed to be quite contented with the state of life unto which they had been called, for they stuck most tenaciously to the silky fur, and resisted with all the energy in their nature any attempt to remove them. Their absence, however, being a prime necessity, vigorous measures were adopted, the whole brood were destroyed, and never afterwards did we see even the ghost of a flea.

One of the first difficulties felt in connection with our pet was in the selection of a name; but some one remarked that he was "a little thing, a

tiny little thing." So we called him Tiny, which by abbreviation became Ti, and Ti he remained to the end of the chapter. When Ti came to us, he must have been either very ignorant, very sullen, or very perverse, for either he did not know that he was hungry, or would not confess it, or was determined not to take any food; anyway, he rolled himself up into a ball, and took no heed of his surroundings; and when unrolled time after time, by being passed from hand to hand for inspection and caresses, he rolled himself up again, and composed himself to sleep. Still the necessity for food was obvious, though Ti did not recognise it; and, moreover, the young proprietor was very anxious to see his "property" feed. We procured some milk, which once was new, and warmed it and sugared it, to make it a decent imitation of the food Ti would probably have been fed on had he remained for some time longer in the "High wood"; but though we held it to Ti's nose, and called Ti, Ti, Ti, any number of times, and in every imaginable tone and pitch, Ti refused to open an eye, much more his mouth. Seeing that he had not arrived at years of discretion, we attempted, by kind compulsion, to force some food upon him; but little could we get into his mouth, much less could we get to pass out again in the direction we desired. After a number of experiments we hit upon an expedient which answered admirably; we took the shank of a tobacco-pipe, and having greased it well, we drew it full of warm sugared milk with the mouth, and then placing the small end between Ti's lips, we gradually forced the nourishing fluid down his throat. On the pipe Ti progressed favourably; but in time the quantity of sugared milk necessary to his sustentation involved a considerable expenditure of time and patience. With the hope of expediting matters, we again tried the spoon; but Ti was obdurate; nothing would induce him to take even sugared milk out of such a hard, cold thing as a spoon; he, however, consented to take a little out of the hollow hand, and when at length he grew too old for the pipe, he took the cup of Diogenes into favour, and to the day of his death preferred it to either china or plate. When Ti arrived at maturity, he became a local celebrity. Never was there a squirrel so tame, so playful, and withal so good-natured; such was the common report, which, although it probably originated very near home, was certainly endorsed by every one who made Ti's acquaintance. Time would fail me to tell of the leaps and falls, the tricks and expedients, the hair-breadth escapes and the sportive doings of Master Ti. The history of his scudding and scuffing behind the book-shelves, the clatter and commotion he made when he had climbed to the shelf in the kitchen, where the pots, pans, and kettles stood in long and shining row, must still remain unwritten.

Ti had a sweet tooth—he liked sugar—and many a time has he mounted the breakfast-table, and, having helped himself to a glistening lump, settled down on his haunches, curled his brush up to his ears, and set to work chiselling off piece after piece in rapid succession; but even this sweet morsel he would lay aside for a little square lump of bread saturated with sweet tea or coffee. Of course Ti liked nuts and sweet acorns: milk he did not care for, and meat in all forms and conditions was his utter detestation: the nearest approach to animal food he ever tolerated was a piece of bread dipped in fresh dripping, but very little would he eat of that.

There were no traces of vice in Ti; you might catch him anywhere and anywhen,—that is, if you could,—and, having caught him, you might roll him up in a ball, wind his brush over his ears, and thrust him into your pocket, where he would perhaps sleep for hours; but if you held him in your hand without caressing him or playing with him, he would try to escape, and after many attempts would probably give you a nip, and profiting by your surprise, escape; but irritate, tease, annoy, or bilk him as you would, he never showed the least resentment; and though he would bite to obtain his release, he never did it with malice aforethought. Ti hated confinement with an honest hearty hatred. Give him liberty and an acorn and he was content; but all the sugar in the world would never sweeten confinement, no matter how large the cage; and we did make him one larger than a mastiff's kennel; but it was a cage all the same, and the moment he was put in, he set to work to get out; and if he could not succeed, he would come to the front, and there pivoting himself on his hinder feet, he would see-saw from side to side, bringing down his fore feet alternately right and left of an imaginary straight line running between his two hinder feet. In this way he would keep up an incessant and monotonous pit-pat pit-pat for a very long time; and it not unfrequently happened that he obtained his liberty again, because we preferred his freaks and mischievous pranks to seeing him in such apparent agony. Poor Ti, that was his ruin: one day he was thus let out, and after a time forgotten, and when again remembered was nowhere to be found. The house was searched, every bed unmade—for the villain would get into bed sometimes; every closet was ransacked, every means of egress examined; but no Ti could be found. At length the tip of his brush was seen protruding from under his cage, and that being removed, disclosed his cold, stiff, and flattened body. The cage had apparently been left so that he could crawl under it, and in so doing he had brought it down upon himself. Alas, poor Ti! We buried him in the garden amid the sorrow and regret of all, and more than one eye was wet, for he had ceased to be "property," and had become one of the family.

W. C.

ON CLEANING DIATOMACEOUS GATHERINGS.

VARIOUS methods of preparing Diatomaceous material for mounting have from time to time been given in the numerous text-books treating on microscopic manipulation. I will, therefore, suppose the reader to be well acquainted with the use of nitric acid for the purpose of getting quit of delicate vegetable and calcareous matter, and also with the sulphuric acid and potash process. The manipulator is, however, often disappointed with the appearance of his slides after using the methods just alluded to; one source of annoyance is the precipitation of the diatoms in little flocculent tufts, and although shaking the test-tube or bottle temporarily breaks them up, they form again when a drop is placed on the slide: the cause of this appears to be the remains of minute fibrous matter; this may be got rid of by adopting the following plan. Pour off the supernatant water, and replace with strong ammonia, cork the test-tube or bottle, and allow it to stand for two or three hours, then shake it well, and the diatoms will be found to fall gradually; and, after the lapse of an hour, if the diatoms are minute, pour off the ammonia, and wash the deposit with distilled water, until all traces of it are got rid of. Ammonia, unlike the caustic alkalis, do not injure the siliceous valves, even after the lapse of weeks.

Another, and perhaps a still greater cause, of what are usually known as dirty slides, is the presence of minute particles of sand, which no amount of washing or dividing into densities will eliminate. The plan I am about to describe will be found effectual in getting quit of this annoyance. The *modus operandi* is as follows:—I take two slides, which we will call A and B; on A I place a drop (not too small) of the material, on B a drop of distilled water; I now take up A, and shake it so as to cause a slight whirling motion in the drop, and then suddenly tilt it towards one corner, the water, of course, flowing to the lowest point, the drop I allow to run into the drop on slide B; it will then be found that the water has separated the diatoms, leaving the sand behind.

If the quantity of material is small in quantity and rare, the sand and the few diatoms mixed with it can be washed into a small test-tube, and the eliminating process just described may again be applied to it. If the material contains large and heavy forms, such as Eupodiscus and Aulacodiscus, they are better picked out, as from their size they are apt to be left behind. I have, however, found no difficulty in separating the largest forms in the Toome Bridge deposit from the sand by this method. If the material is very sandy, the drop on slide B may be treated as it had previously been on slide A. This method, although occupying some little time, and requiring a little practice, will amply repay the manipulator in the greatly improved appearance of his slides.

Norwich. F. KITTON.

SONG LARKS.

NATURE is again resuming her lovely robes: we shall soon be surrounded by our beautiful choristers that charm us as we stroll through the wood. The charming wood, clothed as it were by magic, the flowering thorn, the pretty primrose and other little flowerets, all seem smiling at their old friend the ivy-clothed oak. How new, how enjoyable; yet spring is but a repetition; how still, how grand everything is as we stand, listening to the sweet note of some bird that sings so freshly in Nature's great concert-hall. Migratory birds are fast arriving to swell the sublime chorus.

We shall now enjoy the grotesque flight of the Titlark, toying and treating us to jerks of his finely measured note, singing with amorous vigour to charm his mate, whom he has preceded by a few days. The Titlark is a delicate, pretty little bird, slight and fragile in appearance; it is about half the size of the Skylark; it builds in the grass, and sometimes in low bushes; it runs very swiftly; it sings on the ground, on the branch of a tree, and on the wing, but does not mount like the Skylark. The song of the Titlark is good and very pleasing, and is much used to teach other birds, but mostly to teach the Linnet and Canary. When first caged, there is a little trouble in getting them to feed; but when you get over that, they soon sing. To get them to feed, you should place a few mealworms under a glass, around which you can give them some bread and egg chopped fine, on the top of which you can strew a few mealworms cut in pieces. When they see the worms move under the glass, they will pick at them, and thereby will be tempted to eat those around the glass: after a day or two they will take their food readily.

But for all this they do not live long in captivity, seldom living more than one season. They lose their appetite; they also moult twice in a year, which mostly reduces them to extreme weakness, from which they mostly die.

There is another bird much like the Titlark, called the Pipit. It is sometimes mistaken for the Titlark by inexperienced lark-fanciers; but the Pipit is more diminutive and not so bright in colour: they are sometimes taken in great numbers in the autumn: it is soft-billed, feeding mostly upon flies and larvæ. As a caged bird it is perfectly useless; it has not any song, merely a call—pip-pit.

But the Lark is raised to the highest pitch of beauty in the Woodlark, whose song is perhaps

second to no bird that adorns our land; he makes our woods ring to the echo. I have known some of my friends, when listening to the Woodlark, think it the song of the Nightingale, a bird which it is little inferior to in song, and in some instances surpasses, for it is easy to obtain, and not much trouble in keeping in health, and will sing freely almost anywhere, in spring, summer, and autumn; indeed, too much cannot be said in praise of this charming songster. I have seen this bird kept in a small cage, and even then sing well; but this is an injustice: it should have a cage about 15 by 10 inches, with two perches about 2½ inches from the bottom, and boxes outside for food and water; taking care to give plenty of gravel on the bottom, mixing it occasionally with a little wood-ash, which will be found an excellent preventive against vermin; but if your cage be made of mahogany, little else is needed. The Woodlark differs from many birds; *e.g.*, it will not take the song of any bird, although you hang it near others that are incessantly singing, as though it were aware of its own matchless song, and not one note will it take of another. This is one of the few birds that sing in the night, the others being the Nightingale and the lesser Reed-sparrow. White, in his "Selborne," says "the Woodlark is often suspended in hot summer nights all night long."

The Skylark mounting and singing is really a beautiful bird, and one whose acquaintance is perhaps more cultivated than any of our English song-birds. This familiar songster has been highly praised by the great bard Shakspeare, "Hark, the lark at heaven's gate sings." It is very hardy, and will live to a great age, living sometimes twenty years: it should be purchased when a brancher; it will attain perfection in song at three years of age; its song will then remain good for many years. A brancher should be kept near a flight-bird, that is, one that moulted and learned his song in the field, for the Skylark is not like the Woodlark; on the contrary, it is really a good mocking-bird, and will take the song of any bird it may be near, especially at moulting time. I have heard the Chaffinch and Linnet imitated to perfection by this bird; it requires but moderate care, food as for the Woodlark, with turf and large cage; all larks should have a little canary-seed mixed with a plentiful supply of gravel, and fresh water at least once a day.

CHAS. J. W. RUDD.

A DOUBLE ORANGE is to me a novelty. It was of the ordinary size, and divided into "quarters" as usual, but the quarters fitted accurately upon a little orange inside. This little one divided into quarters also, and was yellowish, as if enclosed in a thin skin. It contained pips, as also did the outside one.—*W. L. W.*

PROCESSIONARY MOTHS.

CERTAIN members of the Lepidopterous, or Moth and Butterfly order, belonging to the genus Cnethocampa of Stephens, have a curious history of their own, partly on account of the regular order which the larvæ retain when moving from one spot to another, and partly because, from their structure, they must be ranked among the enemies of mankind. The particular species are the Wild Pine-moth (*Cn. pityocampa*), the Stone Pine-moth (*Cn. pinivora*), and the Processionary Moth (*Cn. processionea*). Neither of these species is known in England, but on many parts of the Continent they are by no means uncommon, and often work much damage in the forests; the first-named attacking the Scotch fir, the second the fir from which it takes its name, and the last confining itself to the oak (fig. 62).

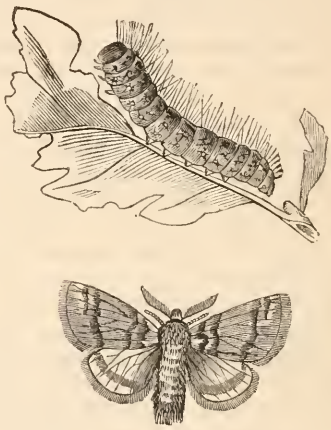


Fig. 62. Caterpillar and Moth of *Cnethocampa processionea*.

The larvæ are "sociable" in their habits, feeding together in large numbers, and, like so many sociable insects, they are wont to migrate on occasions. The term "processionary" has been applied to them from the singular manner in which these insects arrange themselves when on the move, and the regular order which they preserve during a march. They are evening or night feeders,—at least they rarely start on a journey before the sun has set; and then, if it be necessary to change their quarters, a single caterpillar takes the precedence by common consent; he is at once followed by a second; this by a third; and so on until the "procession" has reached about two feet in length. Then two caterpillars appear side by side, with two more behind them for several ranks. At a given point they arrange themselves in threes; after another interval in fours; still later in fives, sixes, &c.; until the whole swarm is in motion, the later ranks having as many as twenty individuals side by side.

By what instinct they are led to arrange themselves in this singular manner it is impossible to say; but so compact is the body, and so well-set the ranks, that the spectator rarely, if ever, sees a head protruding beyond its neighbour next in advance; the line, in fact, is as firm and well-arranged as in the best regiment of a well-disciplined army. Nor is this all: no sooner does the leader stop, than the ranks immediately behind him come to a halt, as though by a common impulse, and a fresh move forward is made with the same precision and regularity. This continues until the new feeding-ground is reached, when the caterpillars disperse for a while, ready to rearrange themselves at some signal entirely hidden from our ken.

So far these little creatures appear as very harmless members of insectdom; but however much we may admire and wonder at the strange instinct which guides these larvæ on their path, it is well not to venture too near their forest haunts, for they are gifted with a property which renders them anything but pleasant neighbours. I allude to the "urticating" nature of the hairs with which the caterpillars are clothed.

The moths themselves are perfectly innocent; sombre in colour and quiet in their habits, they live the usual *insouciante* existence of their tribe, never willingly obtruding themselves on the world: it is the progeny to which they give birth that makes itself felt, in more senses than one. No sooner are the little torments brought into the world, than they surround themselves with a common web, within which they seek shelter, and to which they retire when danger threatens.

All this is only what is done by our Ermines and Gold-tails, and many others of our native Lepidopters; but unfortunately for the good name of these Cnethocampids, and for the peace of mind of those who come near them, these caterpillars are clothed with tufts of hair of a peculiar and most aggravating kind. The web, too, which grows with their growth until it is sometimes as large as a man's head, becomes impregnated with these hairs, which are very long, of a black and white colour, and either smooth or barbed and feathered (fig. 63).

Woe to the person who incautiously meddles with one of the nests, or picks up a caterpillar. No sooner do these poisonous hairs come in contact with the surface of the body, than they produce an itching sensation, followed by inflammation more or less severe, according to the state of the victim and the condition of the atmosphere. Sometimes the effects are no worse than those made by the sting of a nettle, the wounded part swelling, and the skin after a while peeling off: at others, the irritation caused by the entrance of the pointed hairs into the pores of the skin has been known to produce a very serious illness, and even death.

From their very fragile nature, these hairs are unfortunately scattered like so much fine dust, and as they cling to whatever damp objects—such, for instance, as the human body—they may chance to touch, the discomfort, to say the least of it, produced among persons compelled to frequent the forests in which these animals abound, is almost indescribable. To disturb their web-made castles, which are placed against the tree-trunks, or suspended from the boughs at a few feet from the ground, is attended with considerable risk, as the hairs are in that case set free and dispersed in every direction.



Fig. 63. Hairs of the Processionary Moth, magnified.

The Processionary Moth abounded in the woods which, previously to the late unhappy war, skirted the city of Paris, and were a source of no small annoyance to the citizens, who loved to stroll and picnic in the leafy glades. If there was one spot on earth dearer than another to the Parisian, it was the Bois de Boulogne, as it stretched away from the Arc de l'Etoile, with its pretty rides and alleys. But much of his admiration for his favourite lounge was damped by the presence of the "*chenille venineuse*," as it was termed. Indeed, when their webs were more than usually abundant, as was the case in the year 1865, many parts of the wood were positively closed by the authorities against the promenaders.

In the southern departments of France the danger of coming in contact with these treacherous insects is so much considered, that persons compelled by business to be near a tree infested by them are recommended to envelop their bodies in oiled linen before attempting to cut off and burn a branch on which a web has been formed. No cattle can be driven into the woods infested by the moth. Woodcutters are warned to be careful to protect themselves by anointing the exposed parts of their bodies with oil: nor should they ever, if possible, approach any part of the forest where the moths abound, in the face of the wind, lest the minute particles of hair be blown into their faces.

The dead caterpillar is to be as carefully avoided as the living animal. The celebrated Reaumur, in his monograph of this insect (*Mém.*, tom. ii.), mentions, that while engaged in dissecting it, his skin

became inflamed and covered with a kind of eruption, and that his eyes were affected for several days. Bonnet too felt an extraordinary numbness in his fingers shortly after removing some of the larvæ from the water in which they had been drowned. The numbness was followed by an itching and burning sensation.

As there is never an evil without its antidote, so in this instance there is a rival insect which helps largely to diminish the numbers of the Processionary caterpillars. This is the *Calosoma sycophanta*, Web., the larva of which is about an inch and a half long, rather flat above, and with the upper surface of the body of so lustrous a black colour that the skin appears to be of a horny nature, though really quite soft to the touch. It has six feet, and a pair of mandibles of formidable dimensions, which cross each other completely when at rest (fig. 64). To

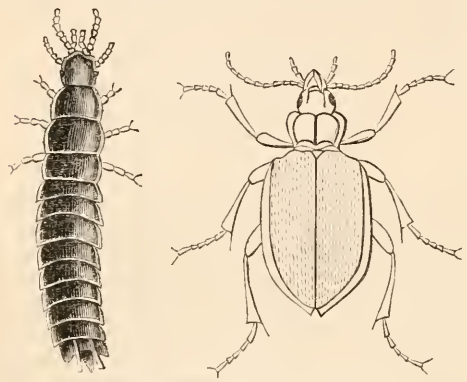


Fig. 64. *Calosoma sycophanta* and its larva.

quote the words of a French writer, "The larva of *Calosoma* appears to have been created for the sole purpose of keeping in check the caterpillars of the Processionary Moth" (Chenu, *Coléoptères*, 55). Utterly regardless of the poisonous hairs with which it must be in constant contact, it forces its way into the nest, and commences a general slaughter of the helpless inhabitants. It is an exceedingly greedy animal, so that a single grub in the midst of a family of caterpillars is as voracious and destructive as a wolf in a sheepfold. It goes on killing and eating, until it literally almost bursts—even that contingency, I believe, is on record in the annals of Entomology; the result being that it at last loses all power of moving, and lies in a state of utter helplessness, gorged and swollen, at the mercy of the first enemy that scents its retreat. And sometimes retribution comes from a quarter whence, perhaps, it was least expected. If, at this critical period, another larva of the same species chances to come near the spot in search of food, it turns aside from its natural prey, and without the slightest compunction fixes itself on its aldermanic brother, nor leaves him until the half-digested juices of the ill-fated Processionaries are transferred to its own capacious interior!

Potterne, Wilts. W. W. Spicer.

THE GNAT.

(*Culex pipiens.*)

THE proboscis of the Gnat has been described as one of the most beautiful of microscopic objects, yet it is doubtful whether it has been understood or truly seen, by many, in its complete condition. In purchased slides one sees what appears a wonderful variety of long, slender spears and lancets scattered over the field of the microscope (though there are really only two piercing instruments); but how these are arranged for use has been hitherto, so far as we can find, unexplained. It is not attempted by Professor Rymer Jones, nor in the Micrographic Dictionary. The shop specimens are commonly mounted in balsam, the heat of which makes the parts warp and fly asunder. The illustration to this paper is drawn from one in chloride of calcium, which answers well, if care be taken in mounting to use no pressure. By the help of this and a beautiful semi-transparent preparation of the entire insect in balsam, and a store of gnats preserved in spirits of wine, we propose attempting to throw some further light upon the several parts of this interesting object, and especially on its conformation.

Gnats in this country are a restricted genus, numbering about twenty species only, and of these only two or three are venomous; the chief offender being the subject of this paper. In other countries they are very numerous, as in the South of Europe and in Australia. India, according to Sir Emerson Tennent, has four mosquitoes. In South America each great river, as Humboldt tells us, has its own peculiar species; and who shall say how many infest the West Indies and central America, where the Spaniards found them, and named them mosquitoes, or the flies, for so the word signifies; the root being the Latin *musca*. We too, have "a fly," a musquito, the *Culex pipiens*, or common Gnat, which, although it has been scientifically distinguished from the true mosquitoes of India and America, is very similar to them in general appearance and habits. In hot seasons lately the Gnats have been so active and venomous that it has been thought they were imported from abroad; but that must always be very unlikely, and the bite of our own gnats, when the blood is at fever-heat, is bad enough, at such times, to account for all annoyances.

The Gnat by night is bold, and makes its attacks rather with perseverance than strategy; but by day its cunning is remarkable. Sir E. Tennent, in his

"Ceylon," notices this of the mosquito most prevalent in India (*Culex laniger*). "When you are reading," he says, "a mosquito will rarely settle on that portion of the hand which is within range of your eyes, but, cunningly stealing by the underside of the book, fastens on the wrist or little finger, and noiselessly inserts his proboscis there." This is just the method of the English Gnat, as many no doubt can testify, who indulge in reading out of doors in the vicinity of lakes or ponds. In describing, then, the proboscis of the common Gnat, that of many so-called mosquitoes may no doubt be included, which gives the subject a wider interest.

The proboscis of the Gnat removed from its sheath (of which we shall write afterwards) has six parts: the lip, or channel for the blood; the tongue; the bands (two in number); and two serrated lancets. Let us describe each of these in succession. The lip (marked 1 in the illustration), though finer than the smallest needle, is the largest and chief part of the proboscis. It has an average diameter of the one thousandth part of an inch. It is an open, boat-shaped channel, through which the blood of the victim is drawn; the end is pointed, and at this part is narrowed just sufficiently to hold firmly the end of the tongue which passes through it. After entering the head, the lip takes a tubular form, and terminates in a globular enlargement, which is connected with the pumping instrument in the thorax and the viscera.



Fig. 65.
Proboscis of Gnat, × 400.
1. Lip or channel.
2. Tongue (the tube),
3. Lancets.
4, 4. Bands (the ends).

The tongue (2) is a long, very slender tube, supported along its whole length by a membrane of the same width and length as the lip, which it exactly covers, so as to make it, with the aid of the bands, an air-tight channel. The bands (4), one on each side, are exceedingly slender bodies, being strips of delicate membrane, broad at the base near the head and tapering gradually towards their extremities; they are there thickened, at the edge, and become again a little broader. The use of these is to enwrap the edges of the tongue-membrane so far as they extend, which is nearly to the end; the thickened edges in this part fitting by a notch over the rim of the lip, and, at the same place, passing across the tongue from side to side, keep it in place. The thickened ends (seen at No. 4) also seem to furnish a stay or rest for the shafts of the lancets, against which they may slide correctly. The lancets (3) are two, one on each side of the lip; their shafts, near the head of the insect, have broad membranes for steadiness, and are, throughout their length, thickened at the back. They move backwards and forwards with an alternate motion.

A wound being made with these, the lip is gradually inserted, and the blood drawn into the channel; not, however, through its end, for that is closed by the tongue, but probably beneath the edges of the tongue-membrane below its junction with the bands.

The use of the tongue-tube is not so obvious. If traced upwards, it is found to enter the head, passing through the upper part of the lip, and terminates at the back of the insect's head in a large pear-shaped gland. This is probably the poison-gland; and it seems to be the office of the tongue-tube to convey the poison into the wound to liquefy the blood, the globules of which, in the larger animals, might otherwise be too large to find an entrance; or if otherwise, this addition to the food may for some other reason be necessary. The tube of the tongue, being in advance of the lip, brings the poison well in contact with the blood.

This delicate proboscis cannot be seen in the living insect as it is represented in the illustration, because it is covered throughout its entire length by a strong, thick, elastic case or cover, split into two parts, and thickly clothed with hair and feathers. The Gnat, not having the power of extending the proboscis beyond this cover, or of retracting it, a question arises as to how the proboscis is brought into use. Réaumur, who, for the sake of observation, courted the attention of these insects, avers that the case is bent like a bow, until the two ends meet. It is not easy to understand how this could be, and we incline to think that this illustrious observer, not being allowed by the wary insects to look very closely, was under an illusion. The proboscis is nearly half as long as the insect, and it is not easy to believe that so slender and delicate an instrument could be driven to such a depth and with such force as this supposition implies. The Gnat has very long legs, and small muscular power, and requires a long trunk to reach its food. The case is, however, provided with a hinge at a distance from the end, of about one-eighth part of its length; here it doubles back easily on each side, and this part is lined with several very fine leaflets, the whole forming a kind of tassel, which hangs loosely over the extremity of the proboscis (as much of it as appears in the illustration). We are disposed to contend that no more than this is brought into use, and that it is quite sufficient to penetrate those smooth and delicate parts of the skin which the Gnat instinctively selects, on the wrist, the temples, the knees, the ears, the eyelids, &c. How,

otherwise, could these sensitive parts be wounded with perfect unconsciousness at the time to the victim? The illustration is three inches in length, and represents about one-eighth part; we may then form a notion of the extension and tenuity of this delicate trunk by recollecting that, on this scale, and in this proportion, it would reach a length of two feet; the breadth being, on an average, about half an inch. The poison of the Gnat is acid, like that of other insects and of reptiles, and the best remedy for it is the speedy application of an alkaline solution; a little carbonate of soda will do very well; and where the swelling is persistent (and it sometimes lasts a week) and the wounded part out of sight, a little of this in powder made into a plaster with soap, and kept on for some time, is a good domestic remedy. But prevention is better than cure. Tourists in the South of Europe and elsewhere will do well to drive out the Gnats. On retiring to rest, set the light in the passage or an adjoining room, and systematically, commencing at the further end, rouse up the troublesome intruders by beating the walls and shaking the curtains, and so urge them through the door, which may then be shut. The few stragglers remaining on the walls may be detected with a light and easily despatched. If but one remains, it will fly straight to its prey through the dark, and there will be nothing for it but to rise, strike a light, and secure it; unless by a happy blow in the dark, as the twang nears your face, you may have him (or rather *her*, for only the females are so intrusive and bloodthirsty) safe and sure between the palms of your hands. Your sleep will then be undisturbed; and although this may seem a great trouble, it is better than a dizzy head, a swollen face, and knotted ears, the ill-concealed smiles of the coffee-room in the morning, and the condolence of your friends. S. S.

NOTES ON ROTIFERS.

ON the 28th of September I brought home a bottle of water from a pond in the neighbourhood for examination. The first drop, with a small particle of weed, supplied, besides many stentors, rotifers, and vorticels, a very large specimen of *Hydra viridis*. He was full of buds—like cups—buds down his body, buds along all his arms; he was more cumbered with children than the traditional lady of the shoe.

The next dip furnished two or three specimens of *Melicerta ringens*. This interesting individual, who builds a house of cricket-balls, has been so well described that I shall not venture to say much about it. It may, however, interest you to know that I kept them alive for several days, from September 28 to October 2. Such minute creatures I prefer to examine on a glass slide with a thin covering-glass over them, which gives them sufficient room for expanding themselves freely, and admits, at the same time, the use of a $\frac{4}{10}$ objective. On one occasion the Melicerta having got under a piece of weed, I took off the covering-glass, and in replacing it broke off a large portion of the tube, without, however, damaging the animal: this accident caused him much trouble; he worked hard all day, and afforded excellent opportunities of examining the method of making and depositing the pellets of which his house is built.

So far as I could discern, by using different powers (up to $\frac{4}{10}$ with C), the pellets, when first made, are all more or less round. If they become hexagonal it is only by subsequent pressure; those in the lower part of the tube are hexagonal (mostly); those in the upper not so.

By the afternoon the Melicerta had added several rows to his dilapidated walls, and by six o'clock the house was much enlarged.

It is not easy to trace the process of receiving, smashing up, manufacturing, and placing the pellets, from beginning to end.

So far as I could form an opinion, it seemed to me that the particles received through the mouth passed at once to the gizzard to be smashed up, and were thence conveyed to an organ, called, I believe, by Mr. Gosse, from its function, the "mill," and from its shape, "the ventilator," to be formed, by rapid rotation and mixing with some viscid fluid, into balls.

It *seemed* as if this organ rejected some particles presented to it, which were shot out with force. The gizzard sometimes worked slowly; the "mill" appeared to be always going at a uniform speed; in shape it is something like the openings in the pygidium of a flea.

By the evening of September 30 the house was finished. October 1, examined the Melicerta with 1 inch and B, and $\frac{4}{10}$ inch and B, and black ground condenser: most lovely; the fans transparent, like pearl. It is impossible to conceive anything more beautiful than the appearance of the Melicerta under this method of illumination—unless it be that of a forest of Floscularia, presently to be described.

There was a constant rush of particles into the mouth at the bottom of a funnel defended by a projecting lip, in shape like a sausage, and from the mouth to the mastax; a constant rejection of particles, and a transference of some to the "mill," whose working under this illumination is particularly distinct.

November 11.—Examined several specimens of Melicerta and of *Floscularia ornata* and *cornuta*. I found considerable difficulty in distinguishing these two forms.

With the black ground condenser the sight was very beautiful. Do not think I am exaggerating when I tell you that there were literally hundreds

of these Floscules fringing both sides of the filaments of myriophyllum, their transparent houses, of a pale, bluish tint, distinctly visible against the dark background—rendered more distinct in some cases, and coloured a darkish brown by the adherence of foreign matter—the long tufts of hair extending to a great length from the ends of the five (or in some cases four) projecting lobes!

These tufts had not, so far as I saw, any independent motion; they are not ciliæ, but bristles; they act as funnels, from out of which unhappy monads entering never escape.

But, though motionless in themselves, yet, after an insect has entered within their limits, they are bent inwards by a simultaneous motion of the lobes towards the centre, and the insect, which has been swimming about freely in the cup formed below the lobes, is forced into the rapacious mouth, speedily smashed up and devoured. The *ciliary* motion (if any) in *Floscularia ornata* is somewhere at the base of the silex, for the insects which get between the tufts, and were unable to escape through them, were *drawn* downwards by a perceptible ciliary motion, though the ciliæ are not themselves visible. However, I am not sure of the correctness of this observation, for on a subsequent day, November 22, I made—as the result of the examination of some hundreds of Floscules—the following note:—The smaller fishes which are so freely devoured appear unable to escape after once entering the funnel of hairs; but there is certainly no ciliary motion sufficient to impede their movements, or direct them in any perceptible degree. They swim naturally and freely within the funnel. It seemed that the Floscule permitted this until the fish presented his head—end on—to the throat, when, by a sudden convulsive contraction of all the lobes which bend inwards towards each other, and a spasmodic action and opening of the throat—like a child straining at a cherry—the fish shoots in in a moment, and is seen no more. I watched this interesting process when monads were swimming about together in the funnel of a large Floscule. But I must spare you further gossip. If you would see a sight of beauty never to be forgotten, examine, under a black ground condenser some filaments of Myriophyllum, fringed with a forest of Floscules: you could not soon forget it. Of all the hundreds which I examined there was not one without eggs—some had four, most of them five—about half way up the pedicle—none at the bottom.

E. S.

Early Appearance of the Cuckoo.—In company with two friends I *saw* the cuckoo at Bredwardine, Hereford, on March 23rd. It was also *heard* on the same day at Eardisley, five miles distant from Bredwardine.—*Rev. R. Blight.*

ZOOLOGY.

Newts.—The Smooth-newt (*Lissotriton punctatus*, Daud.) is the commoner of our native species of the family *Salamandradæ*. It is a very pretty little creature, inhabiting almost every pond, river, and ditch of any importance in this country. The flattened form of the tail, the less graceful body, and the more sluggish movements of the newt, easily distinguish it from the Lizards (*Lacertadæ*), with which, not always by the ignorant, the former creature is often confounded. In the earlier stages of existence, the young of the newts, or tadpoles, breathe by means of gills (*branchiæ*), as is also the case with the tadpoles of the frog (*Rana temporaria*, Linn.); they are placed in tufts or branches, at the side of the head, and are beautiful objects for microscopic examination. The crest of the male is seen to perfection at the breeding season, which is in early spring, when it is beautifully ridged and spotted, but it disappears in summer. Last month I obtained seven newts from a pond on Barnes Common, four males and three females; three of them, by dint of perseverance, managed to scale the slippery surface of the basin, and escaped. The following two days were very warm, and one of these gentlemen was found in the conservatory dried up like a mummy; the whole body was greatly distorted as if the animal had died in great agony. I have not succeeded in finding the other two. My newts have to content themselves with common worms from the garden, blood-worms being not too common in our neighbourhood. The reptiles seize the worm by the middle, which disappears by a succession of snaps down the gullet (*œsophagus*). This occupies several minutes. In the centre of the tub, where I keep them, I have placed a large piece of flint, the summit of which appears above the surface of the water; the animals climb up this, and will remain on it in the same position for hours, and will not stir, not even when I take out the aforesaid piece of flint, and hoist it in the air. Can any of the readers of Science-Gossip inform me of the habits of the Great Warty-newt (*Triton cristatus*), if they differ from those of the Smooth-newt? I have read that the latter reptile sometimes becomes the prey of the former. The Gigantic Salamander (*Sieboldtia maxima*) is, I believe, the largest of this group. I have seen the specimens of this creature at the Zoological Gardens. They are extremely sluggish, and feed on fish. Though I have watched them several times, they have always been motionless at the bottom of the pond. The fish on which they are fed swim close up to and around them, apparently without any sign of dread. These specimens were obtained from the lakes in the mountain districts of Japan.—*E. Halse, Notting Hill.*

Moulting of the Crustacea.—A. E. Murray, in his interesting paragraph on the above subject, does not intimate any acquaintance with the fact that crabs, lobsters, and other similar crustacea, withdraw the fleshy parts of their claws from the old shells by a splitting of the latter, at the narrow parts below, as Réaumur long ago supposed, though often denied since. Not only is this the case, but all the large-clawed crabs have their shelly coverings organized for the purpose, the line where the fracture is to take place being always to be seen. The cast-off shells certainly *appear* perfect at the narrow part of the claws; but a more careful examination in that of a shore or edible crab, a lobster, or a crawfish, will show that the narrow part has given way, and expanded at the valvular place alluded to, facilitating the withdrawal of the fleshy part of the claws. The writer, several years back, detected this splitting in exuvial claws cast off in the Zoological Gardens, and put on one side as a proof that there is no splitting. A less careful observation will convince any one if he will look out for a moulting crab in about six weeks.—*G.*

Longevity of the Goose.—We do not recollect having seen any remarks made with reference to the natural life of this bird. A gentleman, however, who resides in this neighbourhood can testify that he has had a male and female of the genus in his possession for the last thirty-three years, and the old goose still continues to deposit her eggs every season, and would incubate regularly were she allowed. She has lived in a state of conjugal happiness with her lord and master during the greater part of that period, and the couple still seem to enjoy a full flow of health and spirits.—*Larne* (*Co. Antrim*) *Reporter*, *March*, 1871.

Barnacles.—A Liverpool pilot-boat lately picked up in one of the channels of the port an empty brandy-bottle covered with barnacles (*Lepas anatifera*). This proves that the barnacle can attach itself to glass,—a fact which some have questioned. It also shows, as one of the local papers remarks, that a vitreous covering would not protect ships' bottoms from the attacks of these molluses. The bottle has been placed in the museum of the town. —*A. H. A.*

Preserving Pupæ through the Winter.—The other day I went to purchase some pupæ from the lock-keeper at Baitsbite, three miles from Cambridge, and I there saw a box in which he keeps those which he had collected. It struck me as an extremely well-planned one, and I will attempt to describe it. The sides and ends of the box (the size of which is of course optional) were of wood, sloping outwards from the bottom. The bottom was entirely of perforated zinc, and the top of the same material, except a space in the middle, occupied by a wooden lid, by which to take the pupæ in and out. This box was kept out of doors in rather a sheltered position, and the pupæ well covered up in moss. When there has not been rain for some time the moss should be sprinkled with water occasionally. Let me add that this man at Baitsbite has some good insects for sale, as well as pupæ. When I was there he had plenty of *Papilia machaon* and *Ægeria apiformis*, the former of which I am afraid to say is slowly but surely disappearing from its old home in the fens as draining progresses.—*J. R. B. M.*, *Stone*, *Staffordshire*.

The Descent of Man.—The early progenitors of man were no doubt once covered with hair, both sexes having beards; their ears were pointed and capable of movement; and their bodies were provided with a tail, having the proper muscles. Their limbs and bodies were also acted on by many muscles which now only occasionally reappear, but are normally present in the Quadrumana.—*Darwin*.

"Duration of the Pupa State" (p. 90).—I have remaining one pupa of the Privet (*Sphinx ligustri*) and two of the Puss Moth (*Cerura vinula*), of 1869. The others of that year, viz., five of the former and three of the latter, became imagos in 1870. The cocoon of one puss, having been slightly broken, has enabled me to ascertain that the pupa is still alive, but I cannot be certain of the vitality of the other.—*R. Egerton*, 31, *Victoria Road*, *Kensington*.

Gorgonia Flabellum.—Mr. Richmond says, in your last number, that he has seen on the north coast of Cornwall, thrown up by the sea, the axis or horny skeleton of this zoophyte. Is he certain that it was this gorgonia, or the *G. verrucosa?* They are very unlike; but my brother, Richard Quiller Couch, who paid close attention to the zoophytes and calcareous corallines of Cornwall, and published his researches in the third part of the "Cornish Fauna," says that "the only authority for making this species Cornish is Dr. Borlase, who at page 280 of his 'Natural History,' states that it was picked up in Mount's Bay after a storm." It was dead when found, and probably foreign. We have few observers, unhappily, on the north coast of Cornwall. The fan-like or reticulated form of *G. flabellum* is so unmistakably different from the branched appearance of the common *G. verrucosa*, that I am interested, as a Cornish naturalist, in knowing whether Mr. Richmond is certain of the species.—*Thomas Q. Couch*.

Subterranean Fish.—An American paper, the *Montrose Republican*, contains the following interesting paragraph on subterranean lakes and eyeless fishes, seeming to show that the eyeless fish is a

"development" consequent on change of circumstance:—It is well known that great trouble and expense have been caused by the sinking of a portion of the track of the new Jefferson Railroad where it crosses a swamp in Ararat township, in this county. It has been found that under the swamp is a subterranean pond of several acres in extent, and of considerable depth. This pond is covered by about six feet in depth of black earth, which supports a heavy growth of woods. The trees are mostly soft maple, pine, hemlock, and birch, many of them ranging from six inches to three feet in diameter. Last fall it was discovered that this subterranean pond contained many fish of the kind usually found in this part of the country—pickerel and "shiners" among others—but all without eyes! In the darkness of their subterranean abode they have no use for the organ of vision. The Ball Pond, about a mile and a half distant, is now "growing over." A considerable part of it has become subterranean within the last twenty years, and probably before many years more it will be entirely covered like the other. This pond is about twenty acres in extent. For some distance from the shore it is filled with a dense growth of water-lilies, and these, no doubt, furnish the foundation of which the superstructure of earth is commenced. —*The Standard.*

Early Visitors.—While out shooting on Monday, the 10th of April, near Guildford, I heard the Cuckoo for the first time. I thought I might have been mistaken, but the next morning the following appeared in the *Daily News* to corroborate it:—"Yesterday a number of Cuckoos located themselves on Tooting and Streatham Common, and cheered the districts with their welcome cry for some hours, and then scattered and made off for the Surrey Hills. These migratory birds have made their appearance in the south earlier than usual, they being rarely heard before the end of April." Morris, in his "British Birds," mentions one having been heard on the 14th. Can any of your readers inform me if it has been heard earlier?—*J. L. C.*

The Small Eggar (*Eriogaster lacustris*).—Amongst certain of the Bombyces, as well as the *Sphingidæ*, it has been noticed that a second winter is passed in the pupa condition by some individuals, as noted by Mr. Binnie (p. 90), and pupæ of the species named have produced moths even after a third winter, as related by one of the old naturalists (from whom I regret that I cannot quote verbatim); out of a number he reared, one third emerged the following spring, another third the second spring, and the remainder not until the third year. As this moth, and its relative, the December (*Pœcilocampa Populi*), appear at a season when severe weather frequently prevails, this circumstance may be designed to prevent the destruction of the species, by dividing the risk it runs. The reason why others, such as our old friend the Puss-moth, are thus occasionally retarded, is not very clear.—*F.R.S.C.*

Trichiurus in Ireland.—The finding of the Silvery Hair-tail, lately, in two places in South-western England, has been recorded in your pages as an interesting circumstance. You may therefore wish to know that, about three months ago, five specimens of the *Trichiurus lepturus* were obtained in Dingle and Tralee Bays, Kerry, in the south-west of Ireland. They were sent by Dr. Busteed, of Castle Gregory, Tralee, to Mr. William Andrews, of Dublin, who, speaking with authority, declares that this is the first time that this fish has been recognized on the coast of Ireland.—*M. H. C.*

Swallow-tail Butterfly (p. 80).—Some difficulty is experienced in obtaining eggs from butterflies which have been bred in confinement. It is questionable, therefore, whether Mr. Laddiman will succeed in his experiment. We have recorded in "The Entomologist," that Mr. Gaze, having reared some imagos (in 1840), found two paired on his window-blind. He obtained eggs, which were fertile. The female, however, only deposited fourteen, though supplied with nourishment, a small proportion, probably, of the natural number. As must have been noticed, even by the unentomological eye, these insects pair on the wing, and hence a departure from this proceeding is a rarely occurring incident, and even a vivarium hardly supplies the needful space for an aërial excursion. This habit has been well described in the familiar lines of Rogers—

> "Child of the Sun, pursue thy rapturous flight,
> Mingling with her thou lov'st in fields of light."

—*F.R.S.C.*

The Peregrine.—An old female Peregrine Falcon (*Falco peregrinus*, Gmel.), passing over the waters of the Golden Horn, near the bridge across the Horn, stooped amidst the shipping, steamers, &c., and took a gull from off the waters, retiring to a ship's yard close by to consume its booty. After it had eaten for a time, an English sailor went up to the yard, took it by the back and brought it down; it is fat, wild, and healthy. A great number of Siberian, Calandra, and Common Larks were shot in Asia Minor and Europe, in the storm of the early part of February. The storm being more than usually severe in the north, a great number of Siberian Larks have arrived; many have been shot for eating.—*Thomas Robson, of Ortakeny, Turkey.*

BOTANY.

The London Botanical Exchange Club.—For the benefit of "W. W. S." and other botanists who may make inquiries similar to that which you answer at p. 96, will you allow me, in the first place, to state that there is a London Botanical Exchange Club; and in the second, to offer a few particulars regarding it? For some years prior to 1866, there existed a Botanical Exchange Club at Thirsk, under the management of several botanists, prominent among whom was Mr. J. G. Baker. On Mr. Baker's removal to London the title of this society was changed, and in 1867 the first report of the London Botanical Exchange Club was issued, the curators being Mr. Baker and Dr. Trimen. In the same year the sixth edition of "The London Catalogue of British Plants" was published, "under the direction" of the Club. At the present time the above-named gentlemen act as secretaries, Dr. Boswell-Syme being the curator. The rules of the Club are but few. Any one can be admitted as a member upon an annual payment, to either of the secretaries, of five shillings; and, on sending a parcel of dried plants, is enrolled as a "contributing member," and is entitled to share in future distributions. All specimens sent must be carefully dried, and not exceed in size 16 × 10 inches; they must be as perfect as possible, roots being sent of the sedges, grasses, and smaller ferns, except in the case of very rare species. A guide as to what to send may be found in the list of desiderata, which is issued with each report. Each specimen must have attached to it a label, bearing the number and name of the species as given in the sixth edition of the "London Catalogue"; also the locality and county where, and the date when, collected, with the collector's name. Each parcel should be accompanied with a "catalogue," in which the desiderata of the member should be marked, and must be sent each year, by December 31st, to Mr. Baker or Dr. Syme. At the present time the Club contains about fifty members, including almost, if not quite, all British botanists of note. The report, which is issued annually, contains valuable and interesting notes upon the more remarkable species sent for distribution; and, as a brief *résumé* of the annual progress of British botany, is extremely useful. Critical species and varieties receive due attention; and by the aid of one or two members of the Society, among whom Mr. Watson is prominent, country botanists are supplied with good sets of the forms of such plants as *Chenopodium album*, often accompanied with valuable critical remarks. It is, indeed, to the country botanist, who has but few opportunities of referring to large herbaria, that the Club is especially useful. Should further information be desired, the addresses of the secretaries are—Mr. J. G. Baker, 25, Sydney Villas, Richmond, S.W.; Dr. Trimen, 71, Guilford-street, Russell-square, W.C.; from either of whom full particulars can be obtained; as also from *James Britten, Royal Herbarium, Kew.*

Zante Currants in Devon.—In Science-Gossip for March last, on page 67, the second paragraph from the top on the left-hand side, gives an account of "the first home-grown pudding-currants." You will no doubt be glad to receive this communication on the subject. More than twenty years ago, through the kindness of the late Sir Patrick Ross (who for many years was Governor of the Ionian Islands), cuttings of the Zante currant of commerce were procured direct from that island and sent to me; and at the present time I am in possession of a large vine, covering many feet of wall, grown *without any protection whatever*, which has for ten years been a constant bearer: last year, there were more than a hundred bunches of fine currants, averaging ¾ of a pound weight each, with which both puddings and cakes have been made; and, to say the truth, some four or five years ago my *first pudding* of them was made. No doubt, the mode of curing might be improved, as mine have simply been dried in the sun.—*William Kennaway Sprague, Paignton, South Devon.*

The Pineapple (p. 82).—There are fairly complete accounts of this fruit in "The Treasury of Botany" (Lindley and Moore) under "Ananassa," and in the "Penny Cyclopædia." It would be interesting to ascertain when first this term was appropriated to its modern use. It cannot be so restricted in the following line:—"Stormes rifest rende the sturdy stout pineapple tre," which occurs in Tottel's Miscellany, "Uncertain Authors," 1557 (p. 256, Arber's edition).—*R. T., M.A.*

Cammocke.—This can hardly be the *restharrow* in the following passage:—"The cammocke, the more it is bowed the better it serveth" (Lyly's "Euphues," p. 46). If not, what plant is it?—*R. T., M.A.*

Buxbaum's Speedwell.—I last year directed attention to the enormous quantities of Buxbaum's Speedwell which may now be found in agrarian districts. On my farm I now have it everywhere, while the *V. agrestis* is less plentiful. It is simply nonsense to say that it was unobserved or mistaken for the latter, as its fine, conspicuous flowers force themselves upon the attention of the most casual observer. I have spent my life in the country and on farms, and I am quite prepared to state that the *V. Buxbaumii* is abundant over miles of country, where it did not exist five-and-twenty years ago. It is by no means a solitary example of the

spread of interlopers by the extension of cultivation and use of foreign seeds.—*J. B., Bradford Abbas.*

Primrose Oxlip.—I have this day picked from a single root of primrose a scape of flowers, the stem of which was four inches in length, from which proceeded six pedicles, the longest of which was three inches, surmounted by large primrose flowers of over an inch in diameter. From the same roots proceeded the ordinary single-flowered primroses. The general aspect of the plant is much that of the *Primula officinali-vulgaris* of the New English Botany of Dr. Syme, tab. mcxxxiii., but the flowers are of the size, colour, and substance of the primrose, and should perhaps be called Primrose Oxlip, rather than Cowslip Oxlip. We have always considered the oxlip to be a hybrid between the primrose and cowslip; and if so, probably our specimen may be the result of hybridity between the oxlip and the primrose.—*J. B., Bradford Abbas.*

MICROSCOPY.

Covering Objects.—I have been using lately a very simple and efficient little instrument for fixing the glass covers of microscopical preparations,—a conical bullet, the flat bottom ground to a smooth surface. A drop of water fixes the glass cover to this by capillary attraction. The bullet is inverted, and the edges of the cover painted with gold size. It is then held by the pointed end, and the cover is easily and correctly placed in position on the slide. The bullet is left on until the gold size is dry. Bubbles are more easily avoided by this means than by gradually letting the cover down with a needle or forceps.—*T. Howse, junr., Highfiel d Sydenham Hill.*

Trinacria regina.—The Rev. Eugene O'Meara exhibited at the Dublin Microscopical Club, on the 20th October, 1870, a specimen of this interesting diatom from Arran. As our readers will remember, this is one of the species found in the slate deposits of Jutland, and recently figured in the journal of the Quekett Microscopical Club. A second communication by Mr. F. Kitton, describing some new additional forms, appeared in the last number of the same journal.

Movable Table.—Our American friend, in the last number of Science-Gossip, describes a movable table or stand for the microscope and lamp. Having had a very simple contrivance in use for some time, perhaps you will allow me to describe it, in the hope that it may be helpful to my fellow microscopists. It consists of a piece of deal or other wood, 1 inch thick, 11 inches wide, and 18 inches long; over one side is stretched a piece of baize or cloth, which is nailed on at the edges; on the other side is stretched a piece of thick enamelled cloth or common enamelled leather, which is also nailed on at the edges, and the neater this is done the better it will look. The reason for having one side cloth and the other side enamelled, is this: should the table on which the microscope is to be exhibited have a cover, on the enamelled side being placed downwards it will slide as easily as any one could wish. If the table be polished and no cover on, then the cloth side should be placed downwards, and it will slide with the greatest ease. I have worked with several microscopic tables or stands, but certainly prefer this: most tables in use perform a circle, whereas with this arrangement it does not matter what shape the table is, it will do equally well for all; besides which it does not scratch the table, is very firm and steady, is inexpensive, efficient in working, and saves much time and trouble.—*Frederick Blankley.*

Anemone Infusoria.—Dr. Dick, in a little treatise on the "Telescope and Microscope," published by the Religious Tract Society, states that "an infusion of anemone, prepared after the ordinary manner, with cold water, at the end of eight days will afford a new and uncommon animalcule. All the surface of its back is covered with a very fine mask in the form of a *human face*, perfectly well made." Is any reader of Science-Gossip able to deny or verify this statement?—*W.*

Q. M. C.—Among the rising Londoners of to-day who give themselves to microscopic recreation and study, the "Quekett" is a great institution. The work it is doing among young men in London who have evening and Saturday afternoon leisure, has got for it a name. The "Quekett" is the republic of London microscopists and naturalists. It is the popular, teaching, and working club of this metropolis. About six hundred members strong, it is rapidly popularising natural history as a field pursuit in the summer months, and making the microscope a fireside companion in the winter in many a home. With the North London Naturalists' Field Club, and the Old Change Microscopical Society, the "Quekett" is fast removing the reproach which London has suffered from the naturalists of the north. A Manchester visitor to our collecting grounds to-day may find plenty of kindred enthusiasts for nature on the Saturday afternoon. Not to know of the "Quekett" and its work, is to have a limited acquaintance with the Londoners of the rising generation, and of the place the microscope is taking in the pleasures and studies of the period.—*Saturday Afternoon Rambles round London.*

NOTES AND QUERIES.

Vanessa polychloros.—In the summer season the *Vanessa polychloros* is comparatively scarce. I see it occasionally, but not frequently; but in March and April hybernated specimens in excellent preservation (some looking so fresh that they might almost seem just out of the chrysalis) appear in great profusion. I am aware that this species hybernates very freely, but it seems to me singular that it should be a rare butterfly in July and a common one in March.—*G. S. S.*

Bees and Soot (Science-Gossip, p. 71, 1871).—I do not know whether bees make use of soot in the manufacture of honey or not. I have seen bees going into their hives covered with soot, looking as though they were mourning; but this has been about the swarming time. I therefore attributed it to their getting in that state while looking for a habitation.—*A. B.*

Robin.—Robin is, alas! dead. He died, during my absence from home, rather suddenly, for he had been singing away right merrily the previous evening. I much regretted his loss, as, during my stay at Llandudno, I heard that hybrid robin and canaries have been reared. A chemist living in Llandudno, a great bird-fancier, who occasionally exhibits his pets at the Crystal Palace shows, had a stuffed specimen of a robin-canary, a bird he had reared, had been offered five guineas for, and refused it. It had but little of robin in its plumage. My *hen* canary has caught a few notes of poor Bobbie's song, and of an evening, at the time he used to sing, she begins to warble them.—*H. E. W.*

English Herbs used as a Substitute for Gentian.—Apropos of "R. T., *M. A.'s*" question in No. 76 of Science-Gossip, I am happy to inform him that our British flora can boast of very many wild plants which are often successfully used by country people in cases where a medical man would most probably prescribe gentian or quinine. The Willow, *Salix alba*, is one; its bark is both tonic and astringent, and a powdered preparation of it was at no very distant time given by an old woman (a village *Doctoress*, for in those days female M.D.'s were unknown) to a great number of poor people afflicted with the ague. *Doctoress* Nelly's patients recovered; the recognized "Medicine Man's" did not get on so well. Æsculapius became jealous. Woman's rights had not been mooted in those retired parts. A report got abroad that "old Nelly was a witch"; in the mean time the Doctor, having obtained one of the far-famed powders, and sent it up to Bristol to be analyzed, discovered that the chief ingredient in it was the bark of the common white willow growing by the river-side at the bottom of Nelly's garden.

> "There is a willow grows aslant the brook,
> That shows his hoar leaves in the glassy stream."

Nelly did not make "fantastic garlands" like "Ophelia," but she made decoctions and powders equal in value to quinine, from her *Salix alba*. Wormwood is another tonic. It is intensely bitter, and, I should imagine, most disagreeable to take, but it is given in intermittents. A dangerous remedy, I fancy, though the plant is not a poison. By the way, will some kind reader of Science-Gossip set me right if I am mistaken?—but I believe the *absinthe* so drunk at one period in Paris, is made from the wormwood (*Artemisia Absinthium*), *absinthium* being derived from the Greek of "without delight;" yet the French, by all accounts, delighted in the bitterness of their favourite drink. The Germans mix powdered wormwood-leaves in hot beer, and give it to persons subject to epilepsy. Then we have the "*Manzanilla*" of Spain, the useful camomile of our wastes, the plant which, I imagine, gives its name to that particular kind of sherry which medical men now recommend to dyspeptic invalids. The peasantry of America (the United States) give decoctions of camomile largely in rheumatic attacks, the sort of rheumatism known there as "fever and ague"; and some of our own M.D.s are of opinion that it is quite equal to bark in intermittent fevers. Hemp-agrimony, the ground-vine, tansy, and a whole host of others, are native herbal tonics. Your correspondent may have tasted the leaves of the last-named plant in different puddings and omelets, but one of the best uses to which I think it can be applied is that of preserving meat from the attacks of those horrid pests in hot weather to all good house-keepers—flies. A few bunches hung up with uncooked meat or poultry will drive the flesh-flies away—the smell is not unlike camphor.—*Helen G. Watney, Beaumaris.*

Field Club in South-Western London (p. 92).—There is, I believe, no Field Club in the South-western suburbs. The atmosphere of London seems prejudicial, and often fatal to these institutions, which are successful enough in Liverpool and Manchester. The "Society of Amateur Botanists," and its successor, the "West London Field Club," have existed and perished within the last ten years; and even the North London Naturalists' Club is "not so vigorous as when at first started." I should be very willing to assist, as far as I could, in establishing a society for South-west London upon a firm basis.—*James Britten, F.L.S., Royal Herbarium, Kew.*

Earwig (p. 94).—There can be no dispute as to the appropriateness of Mr. Spicer's term, earwing; still, considering the prevalence of the idea connected with the insect, the general signification of its name in many European languages, and the stock from whence we, as a nation, spring, might we not better trace the second syllable to the Saxon wicga, a worm?—thus making the word earwig equivalent to the German Ohrwurm.—*E. P. P.*

The Small Eggar (*Eriogaster lacustris*).—In reply to F. G. Binnie's question in your last number, "are not instances of such great retardation [of emergence of imago] unusual?" I beg to say,—certainly not, in this particular species. I have bred them somewhat extensively, and have invariably found that a small proportion of the pupæ do not change until the second year. Indeed, in one instance not until the third—three pupæ of 1867 did not become imagos until the spring of 1870. Last summer I brought home a brood or two of caterpillars from a hawthorn hedge, fifty-two of which became pupæ in due course. Of these, twelve I gave to a friend. Sixteen males and two females emerged on February 14th; eight males and two females on the 18th; and four females during the following week; leaving eight pupæ still unchanged. Of course, the reason for the retardation can only be surmised; I have seen, somewhere, this theory: that as the

caterpillars are produced very early in the spring, a late and inclement season may destroy their food-plant and themselves; in which case the reserve of pupæ would prevent the total destruction of the species. I should like to ask a question in return: Sometimes a large cocoon is formed, which contains two pupæ, I have never had any insects emerge from these double cocoons. Is this usual? and why?—*H. W. Livett, M.D., Wells, Somersetshire.*

Popular Errors.—Is not E. T. Cox mistaken in supposing the verse in the Psalms, to which he refers, speaks of the adder as being deaf. Why then should she stop her ears? Does it not rather refer to what seems a common opinion, and what the natives in some parts practise,—that serpents of some kinds are charmed, or rendered quiet by music? And so the Psalmist speaks of some who would not listen to advice, and who resembled a serpent whom the most appropriate music could not charm. *Query*—are serpents deaf? —*E. T. S.*

Jet.—In the number of Science-Gossip for this month is a paper by Mr. Taylor on jet, in which he speaks of it as a "pitch or gum," and as "lumps of resin" exuding from the trees. Surely this is hardly a right description. It will cut neither as a gum nor resin in the way of dissolving in any liquid; and on making sections of it, the grain of fir-wood is shown beautifully; as are also the glands possessed by fir-wood. So that I conclude some of it, if not all, *must* have been wood. Further information as to its being a pitch or resin will oblige *E. T. S.*

Willow Leaves for Yeast.—A correspondent of the *Journal of Agriculture* states that the leaves of the common Basket-willow (*Salix nigra*, Marshall) make an excellent yeast, if treated in the same way as is usual with hops. "The discovery," he says, "was made in my family last summer, and after a thorough trial I was convinced that there is nothing equal to it, as it rises much quicker than hops—in half the time,—imparts none of that hop flavour so disagreeable to some, and in fact makes better bread in every way. The thing is well worthy the attention of every good housewife; and lest some should hesitate in consequence of not knowing the medical properties of the willow in question, I will add that it is a healthful tonic, from which no harm can possibly arise."

Cleaning Coral.—If "W. H. M." would boil the coral in milk, I think he would succeed to his satisfaction. I have repeatedly done so with pieces which I have had for years, and find they look as well as when new.—*John M. Campbell.*

Correction of Lenses.—Myself and several of my friends have immersion lenses of Gundlach's, but none of us know how to use the correcting adjustment. I wrote some time ago to Mr. Baker, the agent, to inquire, but he could give me no specific directions. Could you or any of your readers inform me of the correct way, or the best, to bring out the performance of the glasses?—*R. D. Knight.*

Botanical Exchange Club (p. 96).—"W.W.S." The Editor of Science-Gossip is supposed to be omniscient. There *is* a Botanical Exchange Club, and a very good thing too. Curator, Dr. J. Boswell-Syme; Secretaries, Mr. Baker and Dr. Trimen, either of whom will give "W. W. S." all needful information.—*A Member of B. E. C.*

Borax and Cockroaches.—It may not be generally known how very valuable borax is in various purposes of household use. It is the very best cockroach-exterminator yet discovered. One half-pound has completely cleared a large house, formerly swarming with them, so that the appearance of one in a month is quite a novelty. The various exterminating powders puffed and advertised have been found not fully effective, tending rather to stupefy the cockroaches than to kill them. There is something peculiar, either in the smell or touch of borax, which is certain death to them. They will flee in terror from it, and never appear again where it has once been placed. It is also a great advantage that borax is perfectly harmless to human beings; hence no danger from poisoning.—*Journal of Applied Science.*

The Pineapple.—The date of the introduction of the Pineapple to this country should be placed, I think, at least a century earlier than that assigned to it by the author of the "Fruits of Great Britain," quoted in the April number of Science-Gossip; for this reason, that in 1575 a worthy gentleman, whom (for more or less sufficient reasons) I am pleased to consider an ancestor of mine, assumed with the authority of the Heralds' College, a coat of arms, with chevron and birds blue, and all the rest of it, with a crest, "a raven's head couped vert, wings displayed," &c., and "*in the beak a slip of two pineapples gules.*" The excellent knight who received all this honour resided at Christ Church, Hampshire, and it may be permitted to suppose that he was one of those who, in that age of enterprise, distinguished themselves by roaming the world in search of wonders, as gallant mariners, or as buccaneers; and that to him belongs the merit, if not the fame, of the first bringing to this country of this most luscious of tropical fruits. There is one difficulty, however, in this, and on the very face of it (as you will see by the enclosed stamp), that the mode of growth seems to have been quite misunderstood, for the fruit is drawn as though it were gathered from a tree bearing some British pippin. Yet, perhaps, even this mistake (which I hope is due to the draughtsman at the Heralds' College) may help to explain why the name of *apple* was given to a fruit in form, in flavour, and in growth, so utterly dissimilar. Respect for the Chancellor of the Exchequer prevents my signing myself more fully than—*M. Q. M. C.*

Sounding Lead (vol. vi. p. 189).—Under this heading "C. L. J." asks for a description of some sort of plummet, or small drag, which will bring up specimens of diatoms, foraminifera, &c., from considerable depths of water, without the use of tallow. I think I can suggest a kind of plummet which may be found useful, though I have never tried it. My plan is this:—Cast a leaden plummet of an obovate, or inverted pear-shape, adding a ring large enough to have a strong cord attached to it. Near the point bore two or three holes in a downward direction, so as to form as many cells in the lower part of the plummet, or the holes might be bored until they meet, and form a large cavity. If this plummet be dropped, and the line allowed to run out rapidly, the point will sink in the sand or mud, and on hauling it up the cavities will be found to be full.—*A. H. A.*

The Lotus.—Is there any plant in India to which this name can be applied? In one of Milman's translations of Sanscrit poetry a beautiful lake is described as "fragrant with the lotus-flowers."—*A. H. A.*

Cleaning Shells.—In the number for October, 1869, a correspondent asks for some method of removing the outer coating of shells. By using muriatic acid, the outer coating can easily be got rid of, and then the shell may be polished. In this way, I believe, the beautiful Cingalese *Haliotides* are polished, and by employing this method, the common black mussels become handsome purple shells. —*A. H. A.*

Curious Friends.—On the farm where I am at present visiting there is a curious alliance existing between a gander and an old mare pony. If not shut up they are invariably together in the fields, and their heads may be often seen in close proximity, the gander rubbing his beak against the pony's head in the fondest manner.—*E. P. B.*

Singular Freak of Nature.—Under this heading the *Bowdon Guardian* states that in March a Dorking hen, belonging to a Mr. Perkin, of Sharston, Cheshire, laid an egg weighing nearly six ounces. When broken open a perfectly shelled egg of the ordinary size was found inside.—*G. H. H.*

Luminous Fungi.—Two years ago I had some specimens of luminous fungi sent to me from the Cardiff coal-mines; they were parasitic on the shoring timbers, and both fungi and mycelium were phosphorescent. The colliers in the coal-mines of the western boundary of Glamorganshire and adjoining Caermarthenshire are well acquainted with these phosphorescent fungi, and the men state that it gives sufficient light to "see their hands by." In another coal-mine seven miles north of Cardiff some colliers told Mr. William Adams that they had seen lights on the timber when travelling in the dark, and one of them said he was much frightened the first time he saw it. The luminous fungi sent to me from these mines were specimens of *Polyporus annosus*, Fr., and they could be seen in the dark at a distance of twenty yards. I have also seen *Polyporus sulfureus*, Fr., phosphorescent, and Mr. Broome has met with a luminous *Corticium*. I have heard that *C. cæruleum*, Fr., is sometimes luminous. Berkeley says that *Agaricus* (*Crepidotus*) *olearius*, Fr., a parasite of olive trees, is sometimes so luminous in the South of France that letters may be distinguished by its light. A short time since I had a dried agaric (probably a *Collybia*) given me through Professor Church, of Cirencester, which was phosphorescent when gathered; it came from a cellar in Oxford-street. The luminous fungus referred to in the March number of Science-Gossip seems to be the same with *Agaricus Gardneri*, Berk., an interesting account of which was laid before the Linnean Society in 1869, in a letter from Mr. Collinwood. The writer stated that this species in Borneo could be distinctly seen in the dark, shining with a soft pale-greenish light; the older specimens were described as possessing a greenish luminous glow, like the glow of the electric discharge. The mycelium of this species, like the mycelium of *Polyporus annosus*, Fr., mentioned above, was luminous. It was stated that Mr. Hugh Low had once seen the jungle all in a blaze of light, by which he could see to read as he was riding across the island by the jungle road. Several other species are mentioned as phosphorescent in Berkeley's "Introduction to Cryptogamic Botany," p. 365. I have several times observed flowers to be luminous, especially during certain atmospheric conditions in mid-summer; such instances as the luminosity of stale fish, potatoes, &c., are of course known to every one. A year or two ago, when returning home through Epping Forest at night, after a long day's excursion, I saw a very luminous object on the ground in the distance; on nearing it I found it to be a dead rat, which I brought home in my vasculum, and laid on the garden bed, where it preserved its luminosity for several nights.—*Worthington G. Smith.*

Earthworms.—My garden, which, like all suburban little plots, is a great pleasure to me, consists of light soil, and is by no means of that damp and clayey nature that is usual in this neighbourhood. I have always understood worms are never found in any number, except where there is much damp, and that puzzles me extremely, for the whole of my garden is one mass of what the gardener calls "worm casts." Even the gravel-walks are full, and as to the lawn, it seems impossible even to fit it for croquet. A great part of the ground has been deeply trenched, and yet, in a few days after that operation, the soil is again disfigured with these unsightly prominences. The roots of my flowers are disturbed, my newly springing-up patches of flower-seeds scattered about; in fact, I am annoyed beyond description. I am told that these "casts" are the "rejectamenta" of worms, and that the earth is quite deprived of its nutritive powers. It is a hard mass, quite unlike the fine earth that a mole turns up. I have looked early and late, but can scarcely ever see a worm above ground; and what is more puzzling, in digging they do not seem numerous, for I have carefully watched the man whilst so occupied. Now, I should like some of your kind correspondents to enlighten me on some points. Does the abundance of these creatures denote a very damp subsoil? Will it be wise to try to destroy them by some means; and if so, by what? In such numbers as they are, on what do they live? Will not my garden become quite barren if these increase much more? In fact, any useful information, either as to what I am or am not to do, to prevent this sad disfigurement of my flower borders and kitchen garden, I shall be most grateful to receive. It will not be the first time that I have learned very practical wisdom from Science-Gossip.—*H. E. Wilkinson, Penge.*

The Periwinkle and its Shell.—In your last number appears a paragraph under the above heading, signed "A. E. Murray," describing how the Periwinkle repaired an accidental injury to its shell, and suggesting that perhaps other mollusks have the same power. I beg to say that such power is possessed by all mollusks, and I have in my collection many specimens of both land and marine shells, showing most distinctly the new shell, or rather the old shell repaired, by the reproduction from the margin of the outer layer; but if the apex of the shell be injured, or destroyed, or a hole perforated by worms or other parasites, the aperture will merely be closed with the material secreted by the mantle of the animal. There is in the British Museum a special case, showing many interesting specimens of this power of the mollusk.—*E. S. Biden, Kensington.*

Name of the Earwig (p. 94).—I believe that the origin of the name in question could not have been the wing of the insect; appropriate as the appellation may seem to us, it is too much like an afterthought; nor is "earwing" very likely to be corrupted into "earwig." At the time when it was first applied to the insect science was in its infancy, nor is it very probable that the structure in question had been examined, and its resemblance in shape to the human ear noted. Our English name is but the equivalent of the Continental ones quoted; the second syllable (from the Saxon *rigga*, says Johnson) meaning to "bore," or "pierce," or, perhaps, to enter surreptitiously. Hence a meddling, intrusive person was formerly called an "earwig;" and we even now speak of "earwigging" any one—that is, conveying our own version of some incident privately, by way of anticipation lest a less favourable one subsequently present itself.—*J. R. S. C.*

Virtues of Gentian (p. 91).—Does R. T. wish to know whether there is any English name corresponding to that he cites as applied to the gentian; or does he inquire whether allied or similar plants are thus used in England on account of their bitter virtues? I do not think any such name is applied to the species of gentian which occur in Britain. No doubt the one Linnæus speaks of is *Gentiana lutea*, the source of much of the gentian root of commerce, and which is partial to mountainous districts in Central and Northern Europe. We have five native species of gentian, one of which is perhaps doubtful (*G. nivalis*). The commonest is the autumnal gentian (*G. campestris*), growing usually on the chalk or limestone. These do not appear to have been honoured by a place in our rustic materia medica. The Buckbean (*Menyanthis trifoliata*) of the same natural order, is as bitter as its relatives, and this has often been used as a tonic; and even, according to Withering, as a substitute for hops in brewing. The less frequent plant, called the Yellow Buckbean (*Villarsia nymphæoides*) has similar characteristics. Our native species of the genus *Erythræa* also contain a bitter principle, especially *Centaurium*, popularly known as the Red Centaury, and the flowers of which are so sensitive to atmospheric changes. This is supposed to be the *Kentaurion micron* of Dioscorides, also called, says Hallir, "fall of the earth" by some ancient nations, on account of its flavour. This quality is distributed through all parts of the plant, though least in the flowers. We have three other *Erythræas*, which are little noticed coast species, and also bitter.—*J. R. S. C.*

Pedicellariæ of Starfish.—In the February No. of Science-Gossip (which I have only just seen), Mr. P. H. Gosse makes some remarks concerning my suggestions in reference to the above, which I consider quite uncalled for. Supposing my remarks have been anticipated, they might still be interesting to readers who, like myself, have not all Mr. Gosse's interesting books at hand. I can only say, respecting the last part of Mr. Gosse's note, in which he seems to accuse me of copying his suggestions and putting them forward as my own, that my article was perfectly original, and was written after keeping the animals in constant observation for over twelve months; and also that the only book that I referred to while writing was Forbes's History. I have since, however, borrowed a copy of "Tenby," and have carefully read the chapters on Pedicellariæ on the pages mentioned (232—251). My explanation of the use of the Pedicellariæ was, that the *pincer*-like forms holding the substances attracting the infusoria, &c., the latter might be taken in as food by the "fish-mouths," and this idea occurred to me by observing that the large pincer-like Pedicellariæ were always surrounded by these other forms. Now, I cannot understand how Mr. Gosse can accuse me of copying his remarks, seeing that that gentleman does not mention these "fish-months" at all: he says (Tenby, p. 237), "In *Uraster rubens* the *Pedicellariæ*, or the bodies which Professor Forbes calls *Spinules*, and which represent the Pedicellariæ of the Echinidæ, &c., are but of one form;" and goes on to describe more minutely the pincer-like organs. It has somewhat surprised me that the short fish-month forms of Pedicellariæ are not even mentioned by Mr. Gosse, —at least, in his "Tenby"; and one would therefore think that his italicised words, "*and a great deal more*," were, at least, unnecessary.—*Herbert Ingall.*

Cotssold Lion.—"Then will he looke as fierce as a *Cotssold Lion*."—Roister Doister (before 1553, Arber, p. 70). Can any reader explain this expression?—*A.T., M.A.*

Ornithological Queries.—What bird is intended in

> "The tatling *Awbe* doth please some fancie wel,
> And some like best the byrde as black as cole."
> *Gascoigne's Complaynt of Philomene* (1576)?

In Lyly's "Euphues" (1579; Arber's edition) we have, p. 45, "The Birde Taurus hath a great voyce, but a smal body"; in "Euphues and his England," p. 239, "The Byrde *Acanthis*, who being bredde in the thistles will live in the thistles." In a Sermon of Lever's (same edition), p. 56, the word "puttockes" twice occurs: "The filthye gredye *puttockes*, wylde hawkes, and ravenyng kytes be supersticious papistes, &c." Are any of these names in use now?—*R.T., M.A.*

The Cause of Sleep.—Dr. E. Sommer considers that sleep is the result of a *deoxygenation* of the organism. The blood and the tissues possess the property of storing up the oxygen inhaled, and then supplying it in proportion to the requirements of the economy. When this store of oxygen is exhausted, or even becomes too small, it no longer suffices to sustain the vital activity of the organs, the brain, nervous system, muscles, &c., and the body falls into that particular state which we call sleep. During the continuation of this deep repose, fresh quantities of oxygen are being stored up in the blood, to act as a supply to the awakened vital powers. Rest produces, though in a less degree, the same effect as sleep in reducing the expenditure of oxygen.

Picris Broom-rape.—This parasite, so abundant in the hedgerows and clover fields of Dorset, has, from mixing of soils or some other causes, found its way into the greenhouse. Thus we have had it occur on pelargoniums, lobelia, &c. During the past winter a plant came up on a fuchsia in a cottage window of my parish. It has just died down, but it is remarkable for the wide range of plants which it affects, for its rapid spread for the last few years, as also, in this case, for the odd time of its appearance, growing, as it did, upon the fuchsia before that plant had burst into leaf.—*J. B., Bradford Abbas.*

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them. We do not undertake to return rejected manuscripts unless sufficient stamps are enclosed to cover the return postage. Neither can we promise to refer to or return any manuscript after one month from the date of its receipt. All microscopical drawings intended for publication should have annexed thereto the powers employed, or the extent of enlargement, indicated in diameters (thus : × 320 diameters). Communications intended for publication should be written on one side of the paper only, and all scientific names, and names of places and individuals, should be as legible as possible. Wherever scientific names or technicalities are employed, it is hoped that the common names will accompany them. Lists or tables are inadmissible under any circumstances. Those of the popular names of British plants and animals are retained and registered for publication when sufficiently complete for that purpose, in whatever form may then be decided upon. Address, No. 192, Piccadilly, London, W.

E. F. E., E. B.—The "Handbook of British Fungi," Part II., has been delayed on account of the increased number of woodcuts. All is now in type, except the Indices, and it will be issued as speedily as possible.

J. B., L.—We have no knowledge of the progress of Dr. Carrington's "British Hepaticæ."

W. B. F.—Your remarks about the "Descent of Man" do not take the form of argument. Of course we cannot insert rhapsodies. As to the hawk, catch it, and then name it. We are no advocates of "guessing" in Natural History.

E. C. J.—We have not, and have not had, cray-fish for distribution, therefore you must have fallen into error.

G. M. G.—No exchanges should be expected to hold good after the current month.

R. D.—It is difficult to discover how you can ever learn to name mosses for yourself, or know more than a parrot about them, if you send us all your specimens to name for you. It is a kindness to help an amateur who tries to help himself, but it is unreasonable to suppose that our offices, and those of our coadjutors, are at the periodical service of those who are too idle to work out their own problems. This reply is needed by others equally with the owner of the above initials.

L. M. C.—Pale-coloured cockroaches and earwigs are only early conditions; in time they assume their orthodox tint.

C. B.—*A* is a common lichen, *Peltidea canina*; *B* also a lichen, *Ramalina calicaris*; *C* a sea-weed, *Corallina officinalis*; *D* is *Membranipora pilosa* on sea-weed.

E. W.—"Ferns, British and Foreign," by Smith, would doubtless suit your purpose.

J. L. P.—If you capture and send one of the insects we will name it for you, but we do not *guess*.

G. S. S.—1. Yes. 2. Yes. 3. No; *Trifolium hybridum*. 4. Not necessarily, it is *Lepidium ruderale*. 5. Yes.—*B*.

M. D. P.—Pigeons of course. Read a good history of birds. It will be entertaining, and you seem to require the information it would afford. What do you mean by "English Humming Bird"? You must go to warmer countries, even than Torquay, for Humming Birds.

A. N.—What do you mean by the "Musk"? and by "Electric Water"? The ermine is the winter condition of the Stoat, which is common enough in England.

W. J.—Sometimes cartridge paper, sometimes writing paper, quality and size according to taste. Try half sheets of demy cartridge, or if too long, cut shorter to suit you.

C. P. C.—Unfortunately there is no good work on "Rotifers" at a moderate price. Pritchard's "Infusoria" is the best work we could recommend you, as including the Rotifers with descriptions and numerous figures. No details have yet been published for examining the lung of the living frog.

W. F. A.—*Didymium cinereum*. Should be glad of the specimens you offer.

H. J. I.—*Polyporus versicolor*, Fr.

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Collomia Seeds (for showing spiral fibres in section), winged seeds of Paulownia and Lophospermum.—Any good material or slide to H. Wills, Dorset Bank, Warminster.

Placodium fulgens and *Trichostomum convolutum*, offered in exchange for other rare lichens or mosses; send lists to R. V. T., Withiel, Bodmin, Cornwall.

Wanted, an *Amphipleura pellucida* on which markings are visible with any power.—Lieutenant J. C. Greene, Fort Brockhurst, Gosport, Hants.

Cuticle of *Equisetum*, *Flustra avicularis*, and (or) Rhinoceros Horn, wanted (mounted or not) for good list.—C. D., 187, Oxford Street, Mile End, E.

Anacharis prepared for polariscope, and several species of Sphagnum offered for stamped address, and any object of interest; especially *Deulzia scabra*. — Benj. Bellingham, Round Oak, Brierley Hill.

Biscuit Weevils for mounted microscopic objects or water-plants.—W. L. W., 7, Victoria Street, Cambridge.

Twelve varieties of wood sections offered for two good slides. Diatoms preferred.—J. Sargent, Jun., Fritchley, near Derby.

Pupæ of *Melitæa cinxia* (immediately), imagos at the end of the month, for any local larvæ, pupæ, or imagos.—W. Jordan, Binstead, Ryde, Isle of Wight.

Thirty characteristic animal hairs for other good material, seeds excepted.—E. J. Wilson, 43, Upper Cumming Street, Pentonville, N.

Chara or Nitella.—Living plants wanted; arrangements by letter.—Address E. W., care of the Editor of S.-G.

Volvox globator wanted in some quantity, as collected. Compensation will be offered.—Address F. E., care of Editor of S.-G.

Slides of diatoms for exchange for other slides of interesting objects.—Apply to F. Lazenby, Sarum Villas, Basingstoke.

BOOKS RECEIVED.

"The Popular Science Review." April, 1871. London: Robert Hardwicke.

"The Chemical News." No. 592. March 31, 1871.

"The Monthly Microscopical Journal." No. 28. April, 1871. London: Robert Hardwicke.

"The Scottish Naturalist." No. 2. April, 1871. Perth: Society of Natural Science.

"Proceedings of the Bristol Naturalists' Society." Vol. V. 1870.

"Archives of Science and Transactions of the Orleans County Society of Natural Sciences." No. 2. January, 1871.

"Proceedings of the Lyceum of Natural History, New York."

"Land and Water." Nos. 271, 272, 273, 274.

"The Journal of Applied Science." April, 1871.

"The Animal World," for April, 1871.

"The Gardener's Magazine," for April, 1871.

"West Kent Natural History, Microscopical, and Photographic Society, the President's Address and Reports," for 1870. Greenwich.

"Prospectus of the South London Microscopical and Natural History Club." Hon. Sec., F. Hovenden, 63, Angell Road, Brixton.

"Boston Journal of Chemistry." April, 1871.

"American Naturalist." March and April, 1871.

"Illustrated Natural History of British Butterflies," by Edward Newman, F.L.S., F.Z.S., &c. London: Tweedie.

"Saturday Afternoon Rambles round London, Rural and Geological Sketches," by Henry Walker. London: Hodder & Stoughton.

Communications Received.—H. E. W.—M. Q. M. C.—J. H., Jun. A. H. A.—E. P. P.—B. E. C.—E. H.—E. F. E.—J. M. C.—S. G.—E. C. J.—J. B.—R. D. K.—G.—T. R.—E. W.—R. H. W.—W. B. F.—E. D. M.—J. B.—F. L.—H. C. R.—J. B.—G. M. G.—E. W.—H. W. L.—R. E.—L. M. C.—T. Q. C.—C. J. W. R.—E. T. S.—S. S.—J. H.—J. C. D.—W. F. H.—C. B.—R. V. T.—J. C. G.—G. H. S.—G. S. S.—J. R. B. M.—A. B.—R. B—J. R. S. C.—R. T., *M.A.*—W. F. A.—E. P. B.—H. I.—E. J. W.—T. R.—C. P. C. – M. H. C.—J. B.—W. J.—J. M.—W. K. S.—A. E.—W. G. S. —B.—J. S., Jun.—W. L. W.—B. B.—H. J. I.—J. C.—A. N.—C. D.—E. B.—G. H. H.—M. D. P.—H. E. W.—J. L. P.

LUMINOUS PLANTS.

"'Tis said in Summer's evening hour,
Flashes the golden-coloured flower,
A fair electric flame."

COLERIDGE.

THERE are some of the phenomena of life which are so startling in their character that they cannot fail to attract attention, even amongst the unlearned. Of such is the emission of light by insects and plants; especially in countries where fire and light are held to be more or less divine, and the object of adoration, we may anticipate that such phenomena are regarded with peculiar interest. It is so in India, where the idea that some plants, under favourable conditions, evolve light, has firm possession of the minds of the inhabitants. That something of the kind has been observed, only the most sceptical would doubt, but it is equally probable that exaggeration has lent something to the reports. The prevalence of this idea in India long since was noticed by Major Madden in one of the Indian horticultural journals, when he stated that "vague ideas of the existence of luminous plants in India and the neighbouring countries, still float about, as in the days of the old Hindoos and Greeks." The major gave instances, of which some probably had their foundation in fact. It is not that we place implicit reliance on all that we read on this subject, that we are induced to allude to some recorded instances, but rather with the view of collecting together some of the gossip on the subject.

If we refer to No. 153 of the "Journal of the Asiatic Society of Bengal," we find it there recorded that in Affghanistan, "to the north of Nahoo, is a mountain called Sufed Koh, in which the natives believe gold and silver to exist, and in which they say, in the spring, is a bush which at night, from a distance appears on fire, but on approaching it the delusion vanishes." It is very probable in this instance that the belief is based on vague report.

Baron Hugel's name is well known in connection with Kashmere, and, as a naturalist, his evidence, if positive, would be accepted with respect. But again only report is cited, for the Baron says that he was told that the Auk River, when swollen with rain, brings down from Thibet pieces of timber which "shine in the dark as long as they continue moist." The phosphorescence of decaying wood is nothing new, and it is probable that this is attributable to the same cause. Schoolboys *did* believe in the phosphorescence of "touchwood" many years ago, and probably do so now. In those days we have recollections of carrying such treasures in our pocket for practical illustration in the dormitory at night.

Of a somewhat different character was the substance exhibited in April, 1845, at a meeting of the Royal Asiatic Society. It was the rootstock of a plant from the Ooraghum jungles, at the foot of the Madura Hills, near Tuchoor, and was supposed to belong to some species of *Orchis* or *Marica*. It was said of it that it possessed the peculiar property of regaining its phosphorescent appearance when a dried fragment of it was subjected to moisture, "gleaming in the dark with all the vividness of the Glow-worm, or the electric Scolopendra, after having been moistened with a wet cloth applied to its surface for an hour or two; and it did not seem to lose the property by use, becoming lustreless when dry, and lighting up again whenever moistened." The

Gardener's Chronicle stated at the time, that "a small slice of the dried root being wrapped in a wet cloth, and allowed to remain about an hour, shines in the dark like a piece of phosphorus, or perhaps somewhat paler, more like dead fish, or rotten wood."

Accompanying this account in an Indian journal, is the statement that this plant has long been familiar to the Brahmins under the name of Jyotismati, and "is occasionally referred to a species of *Cardiospermum*, perhaps on account of the white crescent on the black seed of that plant." The discovery of the Coromandel plant was made, it is said, by a tuhseeldar, compelled by rain to take shelter at night under a mass of rock, where he was astonished to see a blaze of phosphoric light over all the grass in the vicinity."

Sanscrit authorities refer the Jyotismati to the Himalayas, and Major Madden found, upon inquiry at Almora, that there was a luminous plant well known there by that name and Jwalla-mat, implying the possession of light or fire. This plant proved to be the *Anthistiria anathera*, of which perhaps one root in a hundred is said to be luminous at night during the rainy season. Other grasses, species of *Andropogon* are reported to possess the same property, and both Hindoos and Moslems are persuaded of the existence of a plant called Sunee, extolled for its power of revealing the wonders of fairy-land; and eagerly sought by fakeers and serpents.

In 1845 the natives of Simla were filled with a rumour that the mountains near Syree were illuminated nightly by some magical herb.

It has been supposed that some of these reports may be traced to a species of *Dictamnus*, as there is one which is very closely allied to the European form (the *Dictamnus Himalcyensis* of Royle) which abounds near Gungotree and Jumnotree. If the Indian species really possesses the power of exhibiting itself in the manner of its European relative, it is not at all surprising that the natives should spread its fame as that of a bush ever burning, but never consumed.

Apropos of the European Dittany (*Dictamnus fraxinella*), the late Professor Henslow explained the inflammable atmosphere generated about it, on a calm still evening, as the evaporation of a volatile oil, and adds that "if a candle be brought near it, this plant is enveloped by a transient flame, without sustaining injury."

Fire is said to be latent in the "Summee," which is supposed to be *Prosopis spicigera*, the Jhund of Northern India. It may be that only such latent fire is alluded to as may be obtained by friction.

The English translation of the Ulfaz Udwiyeh gives Siraj-ul-kootrub as "the fairy's lamp—a plant which shines at night like the glow-worm."

Another plant which has obtained the reputation of being luminous, is the Tuberose (*Polianthes tuberosa*). It has been observed, so it is said, of a sultry evening after thunder, to dart small sparks in great abundance from such of its flowers as were fading. The rare occasion when fading flowers, a thunderstorm, and an observer, meet together for such an exhibition, must be some apology for the doubt which may be entertained as to the speedy verification of the facts.

It should be remembered that Josephus, in his "Wars of the Jews" (book vii., chap. vi.), writing of Macherus, says: "There is a certain place called Baaras, which produces a root of the same name with itself; its colour is like to that of flame, and towards evening it sends out a certain ray like lightning; it is not easily taken by such as would do it, but recedes from their hands." The only virtue this root possesses is its supposed power in the expulsion of demons.

As to the incident recorded in connection with the Fraxinella, Dr. Hahn has offered explanations in the *Journal of Botany* for 1863. "When the daughter of Linnæus one evening approached the flowers of *Dictamnus albus* with a light, a little flame was kindled without in any way injuring them. The experiment was afterwards frequently repeated, but it never succeeded; and whilst some scientific men regarded the whole as a faulty observation or simply a delusion, others endeavoured to explain it by various hypotheses. One of them especially, which tried to account for the phenomenon by assuming that the plant developed hydrogen, found much favour. At present, when this hypothesis has become untenable, the inflammability of the plant is mentioned more as a curiosum, and accounted for by the presence of etheric oil in the flowers. Being in the habit of visiting a garden in which strong healthy plants of *Dictamnus albus* were cultivated, I often repeated the experiment, but always without success, and I already began to doubt the correctness of the observation made by the daughter of Linnæus, when during the dry and hot summer of 1857 I repeated the experiment once more, fancying that the warm weather might possibly have exercised a more than ordinary effect upon the plant. I held a lighted match close to an open flower, but again without result; in bringing, however, the match close to some other blossoms, it approached a nearly faded one, and suddenly was seen a reddish, crackling, strongly shooting flame, which left a powerful aromatic smell, and did not injure the peduncle. Since then I have repeated the experiment during several seasons, and even during wet, cold summers, it has always succeeded; thus clearly proving that it is not influenced by the state of the weather. In doing so I observed the following results, which fully explain the phenomenon. On the pedicels and peduncles are a number of minute reddish-brown glands, secreting etheric oil. These glands are but little developed when the flowers begin to open, and they are fully

growu shortly after the blossoms begin to fade, shrivelling up wheu the fruit begins to form. For this reason the experiment can succeed only at that limited period when the flowers are fading. Best adapted for the purpose are those panicles which have done flowering at the base, and still have a few blossoms at the top. The same panicle cannot be lighted twice. The rachis is uninjured by the experiment, being too greeu to take fire, and because the flame runs aloug almost as quick as lightning, becoming extinguished at the top, and diffusing a powerful incense-like smell.

In 1843, the luminosity of plants was recorded in the Proceedings of the British Association. Mr. R. Dowden is said to have made mention of a luminous appearance on the double variety of the common Marygold. This circumstance was noticed on the 4th August, 1842, at 8 o'clock p.m., after a week of very dry weather. Four persons observed the phenomenon. By shadiug off the decliuing daylight, a gold-coloured lambent light appeared to play from petal to petal of the flowers, so as to make a more or less interrupted corona round its disk. It seemed as if this emauation grew less vivid as the light declined; it was not examined in darkness. When this subject was discussed, Dr. Allman expressed his opinion that the phenomenon was not at all due to phosphorescence, but was referable to the state of the visual organ, that is, an optical illusion. This led Mr. Babington to meution that he had seen, in the south of England, a peculiar bright appearance produced by the presence of the *Schistostega pennata*, a little moss, which inhabited caverns and dark places; but this, too, was objected to by a member present, who stated that Professor Lloyd had examined the *Schistostega*, and had found that the peculiar luminous appearance of that moss arose from the presence of small crystals iu its structure, which reflected the smallest portion of the rays of light.

These remarks having been published iu the *Gardener's Chronicle*,* Dr. Edwiu Lankester in a succeeding number communicated some observations on the subject of luminosity, in plants more especially,† in which he referred to many of the facts of luminosity which had been recorded.

"The light from the moss," he says, "mentioned by Mr. Babingtou has also been observed in Germany on another species (*Schistostega osmundacea*). It has been observed by Funk, Brandenberg, Nees von Esenbeck, Hornschuh, and Struve. Bridel-Brideri and Agardh attributed this light to a small alga, which the former called *Catoptridium smaragdinum*, and the latter *Protococcus smaragdinus*, which they supposed occupied the moss. Unger, however, has examiued the moss accurately, and finds that at certain seasons the peculiar utricles of this moss assume a globular form, and beiug partially transparent, the light is refracted and reflected in such a way as to present a lumiuosity on the surface of the vesicles. Meyen says he has confirmed Unger's observations."

With regard to the light given out from flowers, the doctor cites Christina Linnè, Linnæus, the younger Linnæus, Haggren, Crome, Zawadzki, Hagen, Johnson, and the Duke of Buckingham, as amongst the observers whose experiences have been recorded. The plants enumerated by him are the Nasturtium (*Tropæolum majus*), the Sunflower *Helianthus annuus*), the Marygold (*Calendula officinalis*), African Marygold (*Tagetes erecta* and *Tagetes patula*), Martagon Lily (*Lilium chalcedonicum* and *Lilium bulbiferum*), the Tuberose (*Polyanthus tuberosa*), Poppy (*Papaver orientale*) Chrysanthemum (*Chrysanthemum inodorum*), Eveniug Primrose (*Œnothera macrocarpa*), and *Gorteria rigens*.

In addition to the observations on the light of flowers, there are some ou the phosphorescence and luminosity of sap. Mornay describes a tree in South America, called Cipo de Cunaman, with a milky juice, which gave out in the dark a bright light. Martius, also, in a plant which he named *Euphorbia phosphorea*, says that, wheu wounded, the sap gave out a light. To these instances is added a reference to Senebier, who observed in his experiments on arums, on one occasion, when confining an arum iu oxygen gas, that it gave out light as well as heat.

On the same page of the *Gardener's Chronicle* on which Dr. Lankester's observations are printed, another correspondent expresses surprise that any doubt should be thrown on the luminosity of plants. "For," he says, "I have observed it frequently, and have looked for it on each succeeding summer, on the Double Marygold, and more especially the Hairy Red Poppy (*Papaver pilosum*), in my garden at Moseley, in Worcestershire. In the evening, after a hot dry day, the flashes of light afforded much amusement to myself aud to others."

Fifteen years later, and the subject was again revived iu the pages of the *Gardener's Chronicle*, by the record of certain experiences tending to corroborate those of others which had previously been made, and to which we have already directed the attention of our readers.

This observer, quoting from his diary, states:— "We witnessed (June 10th, 1858) this evening, a little before nine o'clock, a very curious phenomenon. There are three scarlet verbenas, each about nine inches high, and about a foot apart, planted in the border in front of the greeuhouse. As I was standing a few yards from them, and looking at them, my attention was arrested by faint flashes of light passing backwards and forwards from one plant to the other. I immediately called

* *Gardener's Chronicle*, 1843, p. 691.

† *Ibid.*, 1843, p. 710.

the gardener and several members of my family, who all witnessed the extraordinary sight, which lasted for about a quarter of an hour, gradually becoming fainter, till at last it ceased altogether. There was a smoky appearance after each flash, which we all particularly remarked. The ground under the plants was very dry; the air was sultry, and seemed charged with electricity. The flashes had the exact appearance of summer lightning in miniature. This was the first time I had seen anything of the kind, and having never heard of such appearances, I could hardly believe my eyes. Afterwards, however, when the day had been hot and the ground was dry, the same phenomenon was constantly observed at about sunset, and equally on the scarlet geraniums and verbenas. In 1859 it was again seen. On Sunday evening, July 10th of that year, my children came running in to say that the 'lightning' was again playing on the flowers. We all saw it, and again on July 11th. I thought that the flashes of light were brighter than I had ever seen them before. The weather was very sultry."*

These instances of luminosity in flowering plants, and those about to be alluded to amongst fungi, are referable to two very distinct causes. Those of fungi being entirely exhibitions of phosphorescence, causes which are inadequate to explain the phenomena in the other cases. Two or three paragraphs have already appeared in recent numbers of this journal illustrative of this phase of the subject, and the following are given as more detailed accounts of the instances alluded to by Mr. W. G. Smith.

The Rev. M. J. Berkeley † alludes to the luminosity of fungi in his excellent "Introduction," where he says, "This luminosity has been observed in various parts of the world; and where the species has been fully developed, it has been generally a species of *Agaricus* which has yielded the phenomena. *Agaricus olearius* of the South of Europe is one of the best known, but other species have been observed, as *Agaricus Gardneri* in Brazil, *Agaricus lampas*, and some others in Australia; in Amboyna by Rumphius, &c. Mr. Babington has observed imperfect mycelia extremely luminous near Cambridge; and Dr. Hooker speaks of the phenomenon as common in Sikkim, though he was never able to detect the species to which it was due. Tulasne, ‡ who has specially examined the luminosity of the agaric of the olive, has observed dead leaves in the south of France to be endowed with the same property, without however, being able to detect the cause. Fabre, in a paper in the *Annales des Sciences Naturelles*, ascribes it to a temporary increase of oxydation.

Beautiful, however, as the effect may be in these instances, it is far excelled by the phosphorescent appearance presented by *Rhizomorphæ* in mines, the splendour of which is described by Humboldt in the most glowing colours. Such *Rhizomorphæ* are, I believe, always mere subterranean forms of common fungi, as is the case with *Rhizomorpha subcorticalis*. Decandolle long since explained their real nature; but it is very curious, if this be the case, that our common *Polypori* and *Xylaria*, which give rise notoriously to such productions, are not themselves luminous when perfectly developed.

Mr. Gardner gives the following account of the Brazilian species first discovered by himself:—"One dark night, about the beginning of the present month (December, 1839), while passing along the streets of the Villa de Natividate, Goyaz, Brazil), I observed some boys amusing themselves with some luminous object, which I at first supposed to be a kind of large fire-fly; but on making inquiry I found it to be a beautiful phosphorescent species of *Agaricus*, and was told that it grew abundantly in the neighbourhood on the decaying fronds of a dwarf palm."

The whole plant gives out at night a bright phosphorescent light, somewhat similar to that emitted by the larger fire-flies, having a pale greenish hue. From this circumstance, and from growing on a palm, it is called by the inhabitants "Flor de Coco."*

It has been stated that the mycelium of truffles is luminous; but this seems to rest upon the authority of one observer, and, as far as we can learn, has never been verified.

Mr. James Drummond, in a letter published in *Hooker's Journal* for April, 1842, and dated Swan River, 1841, gives some account of luminous fungi of that region:—"As respects fungi I would chiefly like to give you some account of two species of *Agaricus*, belonging to that division which has the stem at one side of the pileus. They grow parasitically on the stumps of trees, and possess nothing remarkable in their appearance by day; but by night they emit a most curious light, such as I never saw described in any book. The first species in which I observed this property was about two inches across, and was growing in clusters on the stump of a *Banksia* tree, near the jetty at Perth, Western Australia. The stump was at the time surrounded with water, when I happened to be passing on a dark night, and was much surprised to see what appeared to be a light in such a spot. On examination, I found it to proceed from this fungus. It is six or seven years since this circumstance occurred. The late Dr. Collie, then our colonial surgeon, possessed a good collection of botanical books, which he and I consulted, but without finding anything which bore on the subject.

* *Gardener's Chronicle*, July 16, 1859, p. 604.

† Introduction to Cryptogamic Botany, p. 265.

‡ *Annales des Sciences Naturelles*, 1848, ix. p. 338.

* *Hooker's Journal*, 1840, vol. ii. p. 426.

When this fungus was laid on a newspaper, it emitted by night a phosphorescent light enabling us to read the words round it; and it continued to do so for several nights with gradually decreasing intensity as the plant dried up. A few weeks ago, and not till then, I discovered another instance of the same kind. I was collecting plants on an iron-stone hill in the Toodjay district, when I was struck with the beauty of a large fungus, of the same character as the former, but measuring sixteen inches across, and about a foot from the root to the extremity of the pileus. The specimen which I carried home weighed about five pounds, was very smooth, yellowish-brown above, and dirty-white upon the gills; it gradually became thinner towards the outer edge of the pileus, where it was waved and sinuated. It was the beauty of the species which induced me to gather it, for as to making a full collection of the Swan River fungi, such a task would require an entire season, and the skill of a person who could make drawings or models of them. The specimen in question was hung up inside the chimney of our sitting-room to dry, and on passing through the apartment in the dark, I observed the fungus giving out a most remarkable light similar to what I described above. No light is so white as this, at least none that I have ever seen. The luminous property continued, though gradually diminishing, for four or five nights, when it ceased, on the plant becoming dry. We called some of the natives, and showed them this fungus when emitting light; the room was dark, for the fire was very low, and the candles extinguished, and the poor creatures cried out 'Chinga!' their name for a spirit, and seemed much afraid of it; and I certainly must own it is a very extraordinary 'Will-o'-the-wisp.'"

This then is a summary of the facts which we have been able hastily to collect together concerning the luminosity of plants. There may be other recorded cases which have passed from our memory, or with which we have never become acquainted, and to these it is not at all improbable that some of our correspondents will be able to add others. The subject has now been fairly opened, it is a very interesting one, and it must be confessed still not wholly without mystery, especially in so far as regards the light emitted from the flowers, &c., of the higher orders of plants.

Ireland's Collecting-Case.—We have just examined a portable collecting-case designed by Mr. Sidney Ireland, of Hoxton. It is of japanned tin, with a leather strap to suspend it around the neck. Within the case is a brass clip head for collecting-bottle to fasten to the end of walking-stick, collecting-bottles, bottle fitted with funnel and filter, four large tubes, six small ones, and a dipping-tube. Altogether compact and convenient.

THE STORY OF A LUMP OF CLAY.

By J. E. Taylor, F.G.S., &c.

An outline of the biography of even such a humble individual as myself will not be without interest. I need not introduce myself in learned mineralogical language, for there is not a boy living, old or young, who has not made practical experiments on me. But as clay is not limited to any geological formation, but occurs most abundantly in the later deposits, perhaps it may be as well for me to say to which period I belong.

In the older rocks, what was once clay has since taken the form of slates or shales, subsequent alterations having brought about this change. I may say, therefore, that I belong to that period termed the *Eocene*—a period remarkable for the great influx of warm-blooded types of life. Of these I shall speak presently.

The "London Clay," as it is termed, is the parent deposit of which I am elected spokesman and representative. London has been chiefly built out of this huge bed of clay; whence its geological name. I have a dark bluish-brown appearance, and in some places the fossils enclosed are assembled in great abundance.

Do not confound me with the clay beds referred to by a more recent speaker, which belong to the Glacial period. No mistake could be greater, although very frequently our general appearance is much alike. It is when you compare the fossil remains found in our beds that you would form a just opinion. I was born ages before the clay above mentioned, and, although of marine origin, I came into the world under vastly different circumstances. When I was born, a *tropical* climate existed in what is now Great Britain—when my neighbour was formed the climature was *arctic*. I made my appearance at the commencement of the Tertiary epoch—he did not come until the final close. Between this beginning and end, this extreme of warm and cold climates, a long period of time had elapsed, marked by the deposition of thick strata, some of whose members will by-and-by, I have no doubt, tell you what occurred meanwhile. But, from the time when I was formed to the present, I know there exists a gradual series of beds, in which fossil plants and animals are imbedded, whose types link those of the past with the present living fauna and flora of the globe.

The *Eocene* formation comprehends other strata than that of which I form a part, but I do not think I am egotistic in stating that ours is regarded usually as the principal member. The total thickness of these beds is over two thousand feet. The upper series are well developed in Hampshire and the Isle of Wight, where they bear evidence of having been deposited in fresh water. These are

represented on the Continent by the beds of the Paris basin, famous to geologists as having yielded to Cuvier the first materials for the young science of comparative anatomy.

Taking the upper Eocene strata in England, you find a gradual transition from purely marine to purely fresh-water conditions, the Headon series containing shells and other organic remains usually found under both circumstances. The Bracklesham sands are crowded with fossil shells, chiefly of *Turitella*, indicating how slowly such beds must have been formed, and how suitable was the ancient sea-bottom to the luxuriant development of these molluscs. I should also mention that underneath the London clay proper is a series of strata, chiefly of sands and gravels, ranging to a total thickness of nearly two hundred feet. My hearers who have carefully studied the geology of older formations, will see that a marked feature about these newer deposits is their very *local* extension. Whereas the older beds are almost world-wide in their distribution, the newer are so limited that it is very difficult to correlate them in different countries. Again, the principle of geographical distribution of animals and plants is felt more palpably in these newer than in the more ancient organisms. In the old rocks all over the world you see fossils common to them, but every stratum in the more recent deposits is marked by its own suite of shells, &c.; just as every sea now possesses its own peculiar fauna.

I was formed along the bottom of the sea, at no great distance from land, and yet far enough off for the sediment brought down by the rivers to have had its coarser particles precipitated before it reached the area over which my parent stratum was laid. Consequently, the muddy matter which there fell to the bottom was of a very impalpable character. The distant land was watered by large rivers, whose mouths debouched into the sea, and furnished it with the sedimentary material whose accumulation to the thickness of nearly five hundred feet, ultimately formed the London clay. This land was clothed with a gorgeous and luxuriant flora, more like that fringing the banks of the Indian rivers, or the islands of the Malayan Archipelago, than any elsewhere growing in the world. Principal among the tropical forms were the palm-trees, whose graceful leaves hung over the water, and were reflected in its rippling depths. The succulent fruits of these palms fell in the stream in immense numbers, sometimes literally covering the surface, and were carried seawards. In some places where the clay was forming, these fruits, now known as *Nipadites*, accumulated to an extraordinary thickness, as in the Isle of Sheppy, where no fewer than a dozen species have been met with. You will see the correctness of my inference that an Indian climate and scenery existed in England during Eocene times, by-and-by; but, meantime, I may say that the only places where palms now grow, whose fruit nearest resembles these of the London clay, are the Moluccas. Tree-ferns and fan-palms, also, were not lacking in the brilliant landscape; whilst *Anonas*, or "custard-apples," gourds, melons, &c., completed the list. The rivers which ran through these thickets of tropical vegetation were haunted by crocodiles and gavials, lying in wait to seize the harmless *Palæotheria* which might come to drink, or to bathe themselves in the stream, after the fashion of their nearest living representatives, the tapirs. Opossums swarmed in the forest, and there is good evidence for believing that, towards the close of the period I am describing, monkeys were introduced in what were then English woods! At dusk, large bats, not unlike those of the Indian islands, made their appearance. Many of the fish which lived in the rivers were *ganoids*, that is to say, had bony-plated, enamelled scales, like the Polypterus of the South African rivers. The remains of these fishes and bats have been found in some abundance near Woodbridge, in Suffolk. Lazily lurking in the flowery brakes of the forest were huge serpents, some of them as big as the boa-constrictor, and possessing characters now distributed among that class, the pythons, colubers, &c. In the rivers, and also in the adjacent seas, swam terrible water-snakes, of an enormous size, and with vertically flattened tails, the better to enable them to swim.

As you would expect from such an association of aquatic dangers, many of the land animals fell a prey, and portions of their carcases were either deposited in the river mud or carried out seawards. Hence I can tell you something of them, and point out a few leading peculiarities. Chief and commonest among them were the tapiroid animals, to which I have already alluded. These harmless creatures were lighter built than the modern tapir, although, like that species, they had a short proboscis. Their name of *Palæotherium*, or "ancient beast," is well deserved, as, with the exception of the marsupials, or pouched animals, they are really the oldest warm-blooded quadrupeds with which I am acquainted. They were thick-skinned or "pachydermatous" animals; but, like many of the early types, possessed characters which are now more or less distributed among at least three different groups. The modifications of the higher animals, at the time I am treating on, were necessarily fewer than at present, when such an enormous zoological and physiological "division of labour" has ended in more marked specific specialization. Hence the *Palæotheria* had characters which relate them to the tapir, horse, and rhinoceros! About half a score different species lived together, their sizes ranging from that of a decent horse to that of a pig. Closely allied to this extinct creature was the *Anoplotherium*, or "harmless beast," as both its name and

its structure implied. These last animals, however, were perhaps more abundant in what was then France than in England. Some of them were very small, not much larger than a rabbit, whilst the largest certainly did not stand higher than three or four feet. They usually frequented the marshy places, and were very fond of wallowing in the mud. Like their relatives first mentioned, they had various zoological peculiarities, among which was the additional relation to the modern camel. The *Choropotamus*, or "river hog," was also a genus of the thick-skinned tribe, and stood really as a link between the *Anoplotherium* and the modern *Peccary*. Its habits, however, were not so harmless, as its teeth indicate a tendency to carnivorous habits. The *Dichobune*—so called from the deeply-cleft nature of its teeth—was allied to the group I am describing. The *Hyænodon* was a truly carnivorous animal, its jaws being even better adapted for cutting flesh than those of the modern feline tribe. In some parts of Europe there abounded an animal called *Anthracotherium* from its remains occurring in the peat-bogs or lignite beds of this age. Like that just described, it was of flesh-eating habits, as was also another, very nearly allied to the modern weasel. I have not time to notice the birds and insects of this period—suffice it to say that the latter included forms now to be met with only in tropical districts. But I hope I have been successful in showing the peculiarities about the terrestrial animals, and you will have no difficulty in seeing how important these extinct types are to the naturalist, in enabling him the better to fill up his natural history plan. These "missing links" thus connect groups of living animals which otherwise would never have been harmoniously blended. It is the moral of Mirza's vision over again—the extinct forms have fallen through the trap-holes of the great viaduct of life, whilst only the recent forms have arrived safely at the other side!

You will have seen that, as far as it goes, the testimony of the mammalia is supplementary to that of the vegetation, &c., all tending to prove what I first stated,—that a tropical climate ruled in English latitudes during the Eocene period! The evidence of the marine organisms (with which, of course, I am better acquainted) is exactly to the same point. Just as the Tertiary epoch is remarkable for its large introduction of higher types of animal life, so it is also for the greater influx of genera, animal and vegetable, of living types. For the first time, among shell-fish, you recognize in the fossils of these deposits, forms which are common in existing seas. But it is not in British latitudes, but in *tropical*, that you meet with living genera allied to the fossil. The old *Nautilus* still kept its place, and several species lived in English seas, although it is now scantily represented only in the Indian Ocean. Huge *Volutes*, beautiful *Cones*, *Mitres*, *Terebella*, *Rostellaria*, *Typhis*, &c., abounded; and the very mention of these names at once conveys to the mind of the conchologist ideas of tropical seas. The fish which lived in the same seas were also of a type commoner to warmer areas than to ours. Many species of sharks, some of them, as for instance *Carcharodon*, being of immense size. Turtles lived in these seas and bred there, for carapaces of all sizes, from the juvenile to the adult, are deposited in that part of the mass to which I belong forming the Essex cliffs. As you are well aware, the turtles are now almost entirely confined to the tropical and sub-tropical districts.

You see, therefore, that I have abundant evidence for warranting me in my statement that at the time I was born a tropical climate prevailed here. What it was before I cannot say, but I know that even before the close of the Eocene period, this warmth had already decreased very considerably. You will, of course, remember that between the beginning and close of this period there had elapsed time sufficiently long to enable more than two thousand feet of material to accumulate. The changes which took place in the physical geography meantime were very great. I am speaking of a time when those high mountains, the Alps and Pyrenees, had not been elevated—nay, when the rocky material now forming a portion of their flanks, was being deposited along the sea-floor!

In England and France, marine conditions had gradually given place to lacustrine, and large lakes had occupied the area previously covered by the sea. During the time that these changes were going on, the climature was slowly toning down. The fossil vegetation met with very abundantly in strata of Upper Eocene age in Hampshire, show you this very plainly. Although it includes types now peculiar to warmer regions, it is not so plainly tropical. The succeeding age, the Miocene, bears out what I say, and from the period of my birth until the present, the register of the climature is very faithfully kept in the strata of the earth.

NOTES ON "ÆCOPHYLLA SMARAGDINA" OF INDIA.

THIS ant, which is found throughout the North-West Provinces of India, is about the size of the one found in woods in England, which makes the large loose heaps of fir spines, &c., and which attacks so fiercely when disturbed. It is of a yellow-brownish colour, and the male, whose body is much more slim and pointed than that of the workers, is of a greenish colour; whence the name.

It may be described as an arboreal ant, as it lives chiefly in trees, and is constantly to be seen running rapidly on the trunk or amongst the leaves. In some notes, which were published last year by the Zoological Society in their Transactions, on the

Hymenoptera of the North-West Provinces of India, I alluded to this insect as the born enemy of wasps and hornets, but did not there enter into its history, which I propose to do more fully in these pages. It is known by the name of "mata" by the natives, and I used to call it the "yellow ant." My first acquaintance with it was made when I was in camp, and my tent happened to be pitched under a mango-tree where was a nest of them. They explored every chink and crevice in the tent, and if by chance they were touched, they bit and stung severely. In short, they were a perfect pest.

When walking in a mango orchard one sometimes sees what looks like a nest, or bundle of leaves drawn together, like the appearance produced by the work of the sociable caterpillars. It is generally at the end of the bough. This is their tree nest, for I have been assured by the natives that they also have a nest in the ground under the roots of the tree, although I could never find one. Once, when I had many wasps' nests in my verandah, and wished to get rid of them, I was recommended to procure a nest of the "mata," and hang it up by the wasp's nest. A native got one by cutting off the end of the bough with the nest attached, and it was soon fastened to the end of a long bamboo and set up against the wall near a large nest of *Polistes hebrais*, the "yellow wasp" of the Europeans. On leaving it there, a piece of thread was tied to it reaching to the ground to enable the ants to re-ascend to their home.

Presently a wasp showed himself, when he was set upon by three or four ants. They seized hold of him anywhere, and, of course, all fell together from the roof of the verandah to the floor of the same, rolled about together for a few seconds in mortal struggle, when the wasp was dead, and the ants on their way home again by their ladder, the thread. Thus they went on till not a wasp remained. They will attack hornets in the same manner. On one occasion I took a very fine nest of the large hornet (*Vespa indica*) which I wished to set up for the Queen's College Museum at Benares. I had smoked out the nest, and killed all the full-grown insects with gunpowder, and the comb I brought home. I put the whole affair under a very large wire dish-cover, and then added a small colony of these ants. Next morning between fifty and sixty dead bodies of young hornets, which had emerged from their cells in the night under the cover, were found strewn on the dish. This went on for a day or two, when I let my useful assistants depart. They ran out, and were soon ensconced amidst the leaves of the elephant creeper (*Argyreia speciosa*) which covered the verandah.

As before observed, I had often seen their nests in the trees; I was now to see how they were constructed, and will therefore make an extract from my note-book. "August 22, 1863, Benares.—The nest taken to kill the hornets having been broken, the ants ran out and looked about for suitable quarters for new nests, and very soon had three or four ready. The sight was a curious one. Here is a leaf of the elephant creeper, being seven inches long, five inches wide, and thick in proportion. Here are nine ants pulling over the points of the leaf. And here is the third stage, viz., ten ants are pulling up the sides of the said leaf to make a snug abode. Thus they held it with all their might, standing on their hind legs, till others fastened it all together as they wished, apparently, by some viscous fluid which seemed to issue from their mouths as they passed their heads backwards and forwards, and this hardened into a kind of strong white silk. It then looked as though the edges had been very closely laced together, leaving only an entrance. Then commenced the busy scene of the ants carrying their young to their new homes, of which, within three hours, no less than five were ready. Some of these consisted of several leaves drawn together by their edges, all being similarly secured with silk. I could detect no signs of a queen, although, of course, there must have been some female somewhere.

"There only seemed to be two classes, one of a very small size, and few in number, with small nippers, and another more numerous, with enormous nippers, very active and brave, ever ready to stand on their hind legs and fight every assailant. These also, or others so like them, as to be to an unpractised eye undistinguishable, appear to tend the young with great care, feeding them from their own mouths. These warriors often lost their heads in the encounters with the hornets, for they would fly at a leg, and, grasping it with their nippers, which are constructed to cross each other, they never let go, and, if within reach, the hornet easily bit off the head, which then remained attached to the leg till the death of the carrier. This also occurred in their mutual fights.

"The orderly way in which these ants worked was very wonderful. Who told off their gangs of men for each leaf? Had they many chiefs? And how did they settle how many should go to each nest? In all this the hand of God is apparent, who in His providence provides for the meanest of His creatures. In the mango-trees they often draw twenty or thirty leaves together, when much silk is used; and I have closely-woven specimens several inches square. This silk is very much stronger than any spider's web, and is the only silken fabric I have ever seen which was made by ants.

"In some nests which I examined I found larvæ in different stages attached by a glutinous substance to the surface of the leaf, and I also found them being carried about by other ants for an airing, and being fed from the mouths of the carriers and others. The winged males of this species often fly

into rooms, attracted by the light of the lamps; but I never found them at their home, and until pointed out to me by Dr. Jerdon, I did not know that they belonged to this species at all.

"The leaves are not injured by their joining operations, but continue their growth. They cannot, however, fall when they dry up, because tightly held together by the silk, which is woven so closely in many cases, as to be almost air-tight, and in some slight degree resembles the consistency of a silken cocoon. I could see no sign of any insect food, and the mode in which the larvæ are fed would not necessitate any being stored; and I am only sorry that I was not able to collect more notes on the economy of this interesting insect."

C. Horne, F.Z.S., late B.C.S.

ELECAMPANE

(*Inula Helenium*).

By Major Holland, R.M.L.I.

THIS plant, a member of the sub-order *Corymbiferæ*, of the natural order *Compositæ*, and a relation of the Camomile, the Wormwood, the Dahlia, the *Gnaphalium* or Everlasting-flower of cottage mantelpieces, of the Sunflower, the Groundsel, the Jerusalem Artichoke, the cultivated Cineraria, and the Coltsfoot (*Tussilago farfara*), from which our cough lozenges are prepared, seems to be but little known or cared for nowadays: its name, however, still figures in the catalogue of the confectioner, and its aromatic juice is supposed to be used to flavour "Elecampane rock," the sweetie dear to charity-boys. The farriers and "beast-leeches" of the middle ages had great faith in its medicinal properties; in the glorious Augustan age the cooks and epicures of luxurious Rome esteemed its pungency, and introduced it into their sauces, and the bard of Venusium has sung its culinary virtues, and has handed them down to posterity enshrined for ever in immortal verse.

On wild winter nights, when the fire burns cheerfully in the snug, warm room, while the driving storm rages fiercely without; when the heavy rain lashes and dashes angrily against the invulnerable shutters, and, even louder and more terrible than the howling and shrieking of the sweeping blast, is heard the heavy booming roar, the tremendous thunder of the mighty sea, an old traveller chuckles to find himself well housed in, and an old wandering campaigner nestling comfortably in his easy-chair, realizes the unspeakable blessing of the peace and security of brave old England, and feels deeply grateful for the tender mercies of his safe and quiet home; his eyes turn upwards to the well-filled shelves of his library, and rest lovingly, not upon the ponderous tomes handsomely bound in calf and morocco, but upon a certain upper row of old, worn, ragged, battered, tattered, thumbed and dog's-eared volumes of all shapes and sizes, stowed away high up, and as much as possible out of sight, because somebody has pronounced them "not fit to be seen"; they are his old school-books, the tools he worked with thirty years ago; the grubby old man at the rag-shop would hardly give five shillings for the lot; they are a perpetual eyesore to the housemaid, and are not in favour with the owner of the witching fingers that are sweeping over the keys of the piano, making sweet melody, as though to soothe the inharmonious furies of the bitter gale; but they are very dear to him who now regards them; the old companions of his boyhood, the deep old wells from which his thirsting soul drew its first draughts of



Fig. 66. Elecampane (*Inula Helenium*), ½ nat. size.

the waters of life; his old Homer, his old Virgil, Livy with the appendix torn out, Terence with his back broken, Cicero minus one flap of his cover, Thucydides steeped in red ink, Herodotus up to his eyes in grease, as if he had been a tallow-chandler, and Ovid sadly metamorphosed by having been used for a target in a match with penny cannons; Medea and Hecuba, Nepos, Xenophon, and Cæsar, all show honourable scars; some of these have been round the world with their master, his never-failing

solace and refuge, his confidants, so to speak, in hard times, when all other friends have failed: some are stained with the turbid waters of the Yellow Sea, which dashed in over the weather bulwarks of a stout old "seventy-four," on just such another night as this; one is full of dried fern-leaves, mementos of a deep Brazilian glen; another preserves flowers from South Africa; others bear traces of travel in Old Cathay, in far-off Japan, in Burmah, Bengal, and Madras, and the sunny islands of the Indian Archipelago; the dust of the Great Prairie, the sand of "the City of the Saints" of the Utah basin, the grit of the Rocky Mountains, and the smoke-stains of the camp-fires of the Shoshones, the Snakes, and the Sioux, have smeared and smirched one or two rare old favourites: there is his father's old Greek Testament, in which he first learned, standing at the good old man's knee, to spell out Ἐν ἀρχῇ ἦν ὁ λόγος, and from which his own boy, in the third generation, is now struggling to pick out easy verses: could ever enchanter's wand conjure up such visions; what memories, what recollections of bygone days start into life when his glance falls upon those poor dilapidated volumes, and he falls into a reverie.

He takes down his old Horace; there is an abominable caricature of the headmaster on the inside of the cover; the wicked wags who got flogged for false quantities in Latin verse, took note of the dominie's unwieldy disproportioned shoes, and irreverently nicknamed him σπονδή, because of his "two long feet." Poor old "Spondee," he has long since turned those tremendous toes up to the daisies; may the turf rest lightly upon them.

Turning over the leaves scribbled all over with lesson-marks, and notes, and "fudges," he dips into the eighth satire of the second book, and reads of the "*inulas amaras*" included amongst the constituents of a marvellous sauce with which a lamprey was served up at the ostentatious feast given by Nasidienus.

Two years ago (in the July number of SCIENCE-GOSSIP for 1869) we spoke of modern lampreys from the Severn; let us read what Horace saw of them at a dinner party in the Eternal City, just nineteen hundred years ago.

"A lamprey was brought up, extended on a dish with floating shrimps. On this subject the host observed, 'This was pregnant when caught, since it would be lower in flesh after spawning': for these there was a compound sauce: of oil, which the best cellar of Venafrum yielded; of pickle, from the essence of the Iberian fish; of five-year wine, but made on this side of the sea; with white pepper, and vinegar which has turned with its acid Methymna's vintage while it is boiling; when boiled, Chian, more than any other, suits it. 'I am the first (he said) who taught to boil with it *rough elecampane*, and Curtillus sea-urchins unwashed, since they do better with the brine which the sea-born shell supplies.'"

Pliny declares that "this herb being chewed doth fasten the teeth." Why does not some enterprising perfumer introduce a "Pliny's Patent Inuline Dentifrice," and secure at once his fortune and our molars?

Leonard Mascal (A.D. 1610) tells us how to fasten the loose teeth of a horse: "This disease is gotten by feeding in wet pastures and wet grounds in winter, and thereby his gummes will shrinke from his teeth, and so they will be loose and seem long. Remedy: ye shall let him bloud on the veine under the taile, and rub his gummes with sage tied on a stickes end, and give him the tender crops of blacke bryars with his provender, and so he shall do well againe." The monks, Mr. Sowerby informs us, have sung its praises in one of their jingling Latin rhymes—

> "Enula campana
> Reddit præcordia sana;"

and from a corruption of the two first words the name Elecampane may perhaps have been derived. The famous herbalist Gerarde, A.D. 1597, says, "It is good for shortnesse of breath and an old cough, and for such as cannot breathe unless they hold their neckes upright"; and also that it is "a remedy against the biting of serpents, it resisteth poison, and it is good for them that are bursten and troubled with cramps and convulsions."

It figures repeatedly in Leonard Mascal's book, as a specific for glanders, mange, and other "griefes" in horses. Here is a curious prescription for curing broken wind: "Ye shall take of cloves and nutmegs 3 drams, of galingal and cardamonum together 3 drams, of soot, of bay seed, of cummin more than the other; make all these into a fine powder, and put it in white wine, tempered with a little saffron; then put so many yelks of eggs as all the other in quantity, then temper it all together with the sodden water of liquoris, make him drinke it with a horne, and let him not drinke of foure and twenty houres after." If this does not answer, "ye shall take of the herbes following; that is, of Venus or mayden haire, of flourdeluce, of aw buds, and leaves of liquoris, of cardamonum, of pepper, of biting almonds, of burrach, of each 2 drams, of nettle seed, of Aristolochy, of each 2 drams, of liquoris half a dram, of pitch, of coloquintida, 2 drams; let this potion be given unto him; then if this disease do yet remain, ye shall heal him with this medicine, take the herbes mayden haire, longwort, the crops of nettles, cardus benedictus, herbe fluellin, the roots of dragons bruised, the roots of ELECAMPAN bruised, of waterhemp, of peniroyall, of lightwort, herbe Angelica, of each of these a good handfull, or so many as ye may have of them." This is to be boiled down, and the horse is to be made to swallow the decoction; "the cure is hard,'

the doctor remarks, and recommends that "cool grass and willow leaves" be given to the animal afterwards for food, in order that "these cold herbes may mittigate the heat of the potion."

Like most plants of the same sub-order, Elecampane possesses certain bitter, tonic, and aromatic properties, and the chemical extract *Inulin* obtained from it, is said to be useful as an expectorant and diaphoretic, and has been employed in cases of catarrh, and in dyspepsia: the French prepare from it their *vin d'aunée*. It is rarely seen in gardens at the present time, but we can remember large quantities of it being cultivated many years ago, in a secluded village hidden amongst the South downs of Sussex.

Bury Cross, Gosport.

MISSEL-THRUSH *versus* SQUIRREL.

ON Thursday last, April 6, I was a spectator at a contest, well worth recording, between the above pugilists. Having found a missel-thrush's nest about the middle of March, I was anxious to find out when the young ones would be hatched. I therefore went daily to look at the nest. On Thursday morning a squirrel, feeling, I suppose, a deeper interest than even I did, paid it a visit. He met, however, with a very different reception, for while I was permitted to climb up the tree so as to overlook the old bird on the nest without disturbing her, his kind attentions (whatever his intentions may have been) met with a most cruel and decided repulse. I was just in time to see the squirrel knocked, not only off his legs, but also off the branch on which the nest is built, down to the ground—a distance of ten feet. His bewildered look at such unladylike conduct was a study for an artist. The old bird did not allow him time to recover, but alighted on his back and furiously pecked away at his poor head, so that I began to fear that I should have a dead squirrel to pick up. What with the shricking of the missel-thrush in not very melodious tones, and that peculiar noise of the squirrel when irritated, and the scuffle among the dead leaves, there was a pretty hubbub. The squirrel, after a few seconds, managed to get away and ran up a tree. The bird flew at him again, and again compelled him to come to the ground. He then got into an angle in the roots of a tree, and sat on his hind-legs, boxing away with his fore-legs, in what, I suppose, is the "most approved" squirrel "style," reminding one forcibly of a certain Scottish hero, of whom it is sung,—

> "His back against a rock he bore,
> And firmly placed his foot before."

But the missel-thrush had the best of it, for she flew down at him from above; and no one can be surprised that, with those wings flapping just in front of his eyes, and those terrible shrieks sounding in his ears, the squirrel at once decided that "discretion is the better part of valour," and made another bold effort to escape. He ran about twenty yards along the ground, and in that distance was three times pulled up to defend himself with his fists. At length he reached another tree, and by corkscrewing round the trunk contrived to reach the upper branches. As the tree was one of an avenue there was a good course for him; and now began a veritable "race for life," for the missel-thrush darted with such violence at him that, had she struck him, he must have fallen at least thirty feet. The race continued for nearly three hundred yards, when the missel-thrush gave up the chase and returned to her nest, where she sat for some time, muttering in a very significant manner, and adjusting her ruffled feathers. During all this time, until the race began, I was never more than two yards distant from the combatants, but neither appeared to notice me in the least degree. I saw nothing of the male bird the whole of the time. Had he joined in, I fear that Mr. Squirrel would not have got off so easily. It was a fair fight, and I have now an immense admiration for the "pluck" of the missel-thrush, while I have become more inclined than ever, should I be placed on the grand jury, to find a true bill against the family of the squirrel, on the charge of feloniously entering dwelling houses with intent to murder.

Bredwardine. REV. R. BLIGHT.

A NEW FORM OF PARASITE.

THE unique specimen of this new insect was placed in my hands for description by Mr. T. Curties, F.R.M.S.

I have been unable to procure any further account of it than the bare fact that it was detected as a parasite upon the elephant in Ceylon. Of its relations and true position in the vast series to which it belongs, it is very difficult to judge; and, as is often the case with these minute and apterous forms, various opinions may be assumed and supported concerning it.

There can be no doubt that it constitutes not only a new genus, but the type of an entirely new family of insects. Its very novel and strange form induced me to submit it to Mr. Francis Walker, F.L.S., who has given it the new generic name "*Idolocoris*" (the image or representation of a bug); and I have much pleasure in appending his description and general observations upon its structure and systematic relations.

Genus *Idolocoris*, Walker.—"Female. Body flat, oval; head transverse, a little longer than the prothorax. Eyes lateral, simple, very small; rostrum porrect, linear, stout, not jointed; with three incumbent triangular appendages on each side above on the anterior end; with a lanceolate obliquely retracted appendage on each side, in front of the hind-

most triangular appendages, and with a dentate appendage on each side very near the tip, which bears two bristles. Antennæ stout, 5-jointed; subsetaceous, with a few bristles; a little longer than the head and prothorax together:—1st joint subclavate, almost as long as the three following joints together: 2nd, 3rd, 4th, and 5th joints nearly equal in length.

"Prothorax thrice as broad as long, narrow in front, sides slightly rounded; abdomen nearly twice as broad as the prothorax, and about six times its length, composed of seven segments, all nearly equal in length, except the 7th, which is very small. Legs short, with a few bristles; femora stout; tibiæ shorter than the femora; tarsi terminated by a single, long, slender, curved claw.

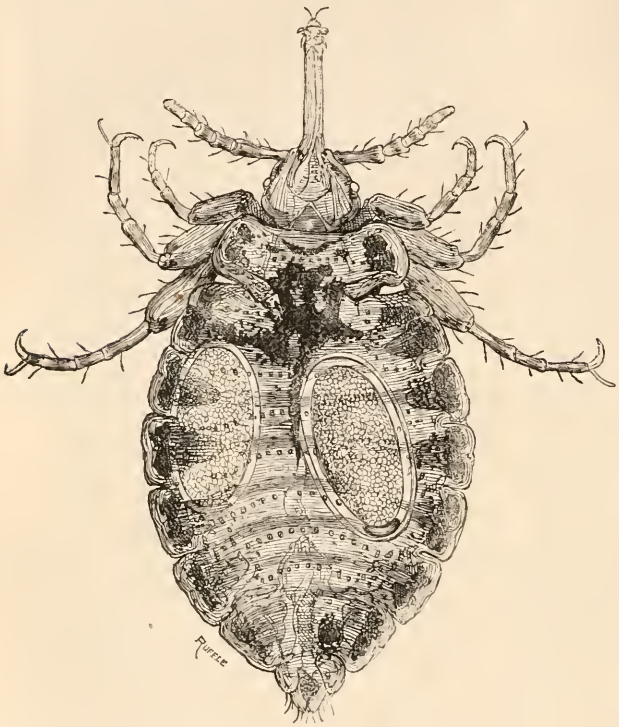


Fig. 67. Elephant Parasite (*Idolocoris elephantis*).

"The insect on which this genus is established has a very peculiar structure, and is the type of a new family of Hemiptera Heteroptera; which family may be placed next to the Acanthidæ, the latter being represented by the bed bug. But it forms the extreme limit of the Hemiptera, and perhaps links will be found to connect it with some of the *Eproboscideous Diptera*."

Idolocoris elephantis.—"Female. Testaceous; sides of prothorax and abdomen with darker marks; tibiæ with darker bands. Length, 1 line."

On referring to the figure, it will be seen that this parasite resembles the Pediculidæ (sucking lice) in the structure and number of joints of the antennæ, in the number of segments of the abdomen, and in the single claws terminating the tarsi. It differs from the bugs in the antennæ, in the unjointed and produced rostrum, and in the single tarsal claws.

The eggs, of which two are contained in the abdomen of the specimen figured, are at once unlike those of the bugs and the Pediculidæ, being simply oval and inopereulate. The spines of the body and extremities are also quite unlike the characteristic spines of the true bugs.

All the long, curved claws are finely dentated on the inner edge with about four points, and a long, straight spine, terminating in a sharply recurved hook, is present at the external base of the claws of the two posterior pairs of legs. The eyes, seen with a power of 2,000 diameters, are simple (unfaceted) and transparent.

The structure of the rostrum is very complex, and with its reflected plates or teeth, it somewhat resembles the central organ of the trophi of Ixodes (Acarina).

Within the rostrum there appears to lie loosely a fine tube, which extends from the apex to the head of the animal, where it enlarges into a bulb. This, without doubt, is the canal by means of which the nutriment is introduced; while a secure attachment is effected by the recurved terminal teeth. When viewed binocularly, the rostrum is found to be bent slightly downwards.

In every particular this strange little insect appears to be exactly fitted for the locality where it is stated to occur; and any one familiar with insect and arachnidan parasites, would at once assign to it, as a "happy hunting-ground," the softer and less exposed folds of the thick skin of some large quadruped.

The Rev. L. Jenyns describes ("Ann. et Mag. Nat. Hist.," vol. iii. p. 241) three species of bugs, parasitical on the common pigeon, the swallow, and the pipistrelle bat; which he names respectively *C. columbarius*, *C. hirundinis*, and *C. pipistrelli*. These insects belong evidently to the genus Cimex (Acanthia); and differ widely from the subject of the present illustration.

It is more than probable that many new and interesting species of parasites would be found on examining with care the large naked-skinned animals which are sometimes imported into this country, and especially when they first arrive, as the treatment to which they are subjected in confinement, although admirable with respect to cleanliness, is very often fatal to the researches of the most determined collector.

Kensington. H. C. Richter.

BRITISH BUTTERFLIES.*

WE have already noticed Mr. Newman's "Illustrated History of British Moths," and before us lies the companion volume of "British Butterflies." The author is such a veteran entomologist, such an experienced writer, so careful an observer, and so apt at plain teaching, that he needs no commendation from us. Let it suffice to say that this volume is fully equal to its companion, in all that author, engraver, and publisher could do to render it attractive and useful; and we recommend it especially to all our youthful readers who are ambitious of becoming entomologists; and, secondarily, to all adults who, whether entomologists or not, desire to possess the most characteristic woodcuts of British Butterflies ever executed. It has been supposed that figures of butterflies possess little value as teachers without the aid of colour. Here is a silent rebuke to such a supposition, for each figure is a "speaking likeness," and we hope that the volume will obtain the success it so well deserves.



Fig. 68. Figures of Rothlieb's Marsh Ringlet, *Cœnonympha Davus*, var. *Rothliebii*; one upper and five under sides; kindly lent by the publisher.

* "An Illustrated Natural History of British Butterflies." By Edward Newman, F.L.S. London: William Tweedie.

PRIMROSES AND COWSLIPS.

THE following communications on this subject have been received during the month:—

From the interest you have taken in the primrose, cow's-lip, and ox-lip, I venture to offer a few remarks on a specimen which came under my notice last week.

The flower was an umbel of eighteen flowerets, fifteen opened and three buds. These were separable into three sets of six each, which may be called outer, middle, and inner.

The limb of the corolla was concave in the inner six, less concave in the middle, and flat in the outer.

The diameter of the extended limb of corolla was $\frac{9}{16}$ of an inch, $\frac{11}{16}$ in., and $\frac{14}{16}$ in. respectively. The colour of the inner and middle set was pale primrose, while that of the six outer was what the ladies call "cuir" colour.

The length from the origin of furcation in the inner set was $1\frac{1}{8}$ inch, and that of the outer set $1\frac{6}{8}$ inch. The position of the stamina, which varies sometimes in *Primula veris*, was uniformly in all these flowers halfway down the tube or unguis of the corolla. The points of difference thus from true-bred plants of *P. veris*, *P. acaulis*, and *P. elatior* consist mainly in the variety of forms in the same umbel, and the altered colour of the corolla in the outer six.

In examining cultivated, semi-cultivated, and wild plants of this class, we find a tendency in *P. acaulis* to develop many-flowered stalks from single-flowered; and, when nourished by pure cow-dung, the colour passes by slow degrees to deep crimson. In a specimen now before me, the colour is deep crimson, the outer stalks single-flowered, and the centre stalks (yet in the bud state) many-flowered, one having four and another five flowerets. This is passing to become a polyanthus.

In *P. veris* the corolla increases in size, and becomes paler in hue, as if resembling *P. acaulis*. In another plant before me of *P. acaulis* of a pale red,

I find one many-flowered stem with eight flowerets and buds, the length varying from $\frac{1}{8}$ inch to $2\frac{2}{8}$ inches from the parent stem.

In several cases of the variety of *P. acaulis*, passing to *P. elatior* (perhaps the *P. officinali-vulgaris*, plates 1132, 1133, of English Botany, third edition: see SCIENCE GOSSIP, Oct. 1867, p. 235), I have seen umbels of flowerets, each of which had its inflorescence on a stalk of three or four inches from the parent stem; and I have also seen, in addition to these umbels, separate stalks proceeding at right angles from the parent stem, at an inch or even two inches below the furcation to form the umbel.

The bearing of this question on the evolution hypothesis of Mr. Darwin, as well as the importance of the principle to certain remarks which I have myself ventured to offer in reference to Xenogenesis (see *Medical Times and Gazette*) "Polymorphism or Xenogenesis in Disease;" and a paper in the May (1871) number of *Monthly Microscopical Journal* on "Transmutation of Form"), lead me to hope that you will see sufficient interest in this specimen to give it insertion in your valuable journal.

It seems to me that if the principle of evolution be allowed, it must of necessity create a perfect revolution in the habit of classification of nature such as has been considered right since the reign of Cuvier over Natural History. It will also smooth the way to unravel much that is now very obscure, and render the system of nature much more intelligible, and develop the unity of creation; or as our Poet-Laureate expresses it,—

> "The ear of man cannot hear, and the eye of man cannot see,
> But if we could hear and see this vision—Were it not HE."

METCALFE JOHNSON, M.R.C.S.E.

I inclose a drawing of an oxlip presenting an interesting deviation from the ordinary mode of inflorescence. The plant is, I think there can be no doubt, a hybrid between a primrose (*Primula vulgaris*) and a cowslip (*P. veris*), and not, as I believe the plants popularly called oxlips frequently are, a developed primrose. It was discovered at Sherborne, Dorset, in a coppice where the underwood had been recently cut, within thirty yards of a meadow where there were numbers of cowslips, the coppice itself abounding in primroses. The plant resembles a primrose in shape of leaves, form of calyx and of corolla, except that the latter is not quite so large, nor so flat or salver-shaped, as in an ordinary primrose; in colour, and particularly in smell, the flowers closely resemble cowslips. The most noticeable feature, however, is the mode of inflorescence. When the plant was gathered, there were the remains of two flower-stems at the base, these having been to all appearance single-flowered scapes; between these rises a stout peduncle bearing a large umbel (larger than in sketch) at its summit, and in addition to this two single pedicels and one pair of pedicels at various distances below, the flowers borne on all being alike. The peduncle, though a stout one, is not more so than usual in a gross-growing plant, and there are no signs of striation or torsion in any part, as would be the case, I think, if it were an instance of fasciation or union of two or more stems.

My own explanation of the case is, that this peculiar and handsome deviation from the ordinary form arises from a redundancy of vegetative power in the plant occasioning a partial prolification of the inflorescence, the racemose condition arising from the umbel being, as it were, drawn out, and the intervals between the pedicels abnormally developed. I should like to hear the opinion of others of your readers. F. J. WARNER.

Winchester.

These communications and the sketches that accompanied them were submitted to Mr. Robert Holland, who has devoted much attention to the subject, and he submits the following observations:—

I return you the two papers on oxlips; I do not think there is very much that is new in Mr. Johnson's paper. The two points of difference from other oxlips which he considers so remarkable, namely, the difference of form and size in the florets, and the difference of colour, are not unlikely to be traced to the fact of the smaller and lighter-coloured florets having *expanded in water after being gathered*. The result is what always takes place when flowers expand in water; but one should scarcely judge without seeing the flowers themselves. And again, it is only reasonable to expect that florets in the *middle* of a large bunch will be robbed of nutriment by the outsiders, and will come out smaller and weaker. Now I come to think of it, possibly this may be *one* amongst other reasons why we so often find outside florets so much larger than the inner ones in many plants, such as *Viburnum Opulus*, some of the *Hydrangeas*, &c., and ray florets larger than disc florets in so many of the *Compositæ;* and may even, perhaps, explain the irregularity of form in the florets of the *Umbelliferæ*, where the petals pointing outwards are generally larger than those which point inwards, as also in *Iberis*.

If the fact (?) which Mr. Johnson mentions of cow-dung turning primroses crimson be proven, it is interesting. It is a bit of Yorkshire folk-lore; but I am inclined to think the real explanation is that cow-dung intensifies colour, but that the primrose to be worked upon must have had a pink tinge to begin with.

Mr. Johnson also confuses *Primula elatior*, as many still do. I think that every time he uses the name, instead of meaning *P. elatior* (Jacq.), he is speaking of the common hybrid oxlip.

One point, on which he lays but little stress, seems to me to be the most interesting, viz., the formation of distant flowers on the scape below the umbel, which is the main subject of Mr. Warner's paper. This abnormity is not uncommon, but is very interesting, and I think is rightly explained by Mr. Warner as a partial prolification of the inflorescence.

ROBERT HOLLAND.



FIG. 69. SAND MARTINS.

From "Our Feathered Companions," lent by the Publishers.



Fig. 70.

WHINCHAT. STONECHAT.

From "Our Feathered Companions,"

KINDNESS TO ANIMALS.

WE have before us three books,* the special design of which is to inculcate kindness to animals. They are all by different authors, but one publisher, uniform in size, style, appearance, and price. If we felt disposed to criticise such books in a discontented spirit, and be over-nice about old stories in new forms, or such-like cavils, we must confess that the object for which these books are written would at once disarm us. Not that there is anything in them that we should disapprove, under the rose; but, after all, we like "Our Feathered Companions" the best. Is it because we love birds so much, that we are led to prefer *this*, the only book of the three written in dialogue, although dialogue books are our abhorrence. It must be so; nothing else, except the object, could sanctify such a means. Of course, Shirley Hibberd's book is well done; and Mrs. S. C. Hall's name is too well known for the good things she has written to leave room for doubt. Altogether, then, this is a worthy trio of books; they are written for a holy purpose, and whilst thanking the authors for their championship of our "dumb companions," we wish the series every success, and speedy sale.

* "Clever Dogs, Horses, &c., with Anecdotes of other Animals." By Shirley Hibberd.

"Animal Sagacity." Edited by Mrs. S. C. Hall.

"Our Feathered Companions" By the Rev. Thomas Jackson, M.A. All published by S. W. Partridge & Co., 9, Paternoster Row.

GILL OF SWORDFISH.

ONE of the latest novelties which Mr. Wheeler of Holloway has offered to microscopists in the way of mounted objects, is a portion of the gill of the swordfish. It certainly resembles (superficially of course) a slice of sponge, and is an

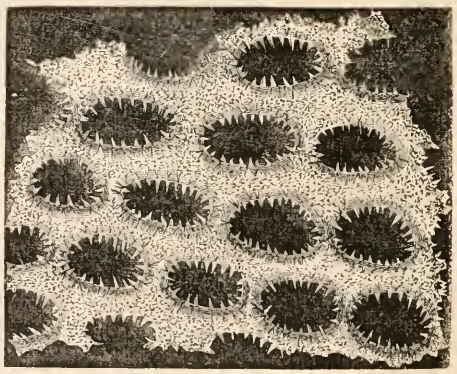


Fig. 71. Gill of Swordfish.

illustration of organic structure at once beautiful and instructive, and will find a place in every good cabinet of objects. Our figure only represents it under quite a low power, but when seen under a higher amplification, it exhibits new beauties which the graver's art fails to render. The slides are "got up" in Mr. Wheeler's best style.

ZOOLOGY.

Rooks.—On the 6th of May the editor of the *Manchester Guardian* celebrated the fiftieth anniversary of its publication by reprinting the first number, which contains several interesting paragraphs on natural-history subjects. The most remarkable of these is an account of several pairs of rooks having, in the spring of 1821, built their nests in some trees at the top of King-street, Manchester, which even then was in the middle of the town. Jackdaws also seem to have been common there, for a number of them assisted the paired rooks in stealing materials from the nest of a solitary old female, who eventually durst hardly quit it to seek food. The same paper mentions a letter in the Bodleian Collection, dated 1735, which states that a Mr. Vernon followed a butterfly *nine miles* before he could catch it.—*G. H. H.*

Summer Migrants.—Birds of passage have, as a rule, appeared somewhat early this spring. I subjoin a list of those noticed by me, and the times of their appearance. I have in no case depended on the information furnished by others, but have entirely relied on the evidence of my own eyes and ears, which rule, I may say without vanity, is the only infallible one. The Chiff-chaff (*Sylvia hippolais*) came on March 24th; the Blackcap (*Curruca atricapilla*) on April 3rd; the Willow Wren (*Sylvia Trochilus*) on the 8th; the Chimney Swallow (*Hirundo rustica*) on the 13th; the Redstart (*Phœnicura ruticilla*) on the 14th; the Nightingale (*Philomela luscinia*) on the 16th; the Sand Martin (*Hirundo riparia*) on the 16th; the Cuckoo (*Cuculus canorus*) on the 23rd; the Whitethroat (*Curruca cinerea*) on the 23rd; the Turtle Dove (*Columba Turtur*) on the 29th; and the Spotted Flycatcher (*Muscicapa grisola*) on May 2nd. Note.—Why do all the books on ornithology, which I have consulted, invariably give the third week or end of May as the time of the appearance of the Flycatcher? In this neighbourhood it always appears very early in the month, be the weather mild or rough. In 1869, I noticed it on the 2nd of May; in 1870, on the 5th; and this year on the 2nd. While I write (May 8th), a pair of these harmless and useful little birds are building in a pear-tree trained against the walls of this house, where they or their progenitors have reared broods of little chirpers year after year.—*William Henry Warner, Kingston, Abingdon.*

Puttocks (p. 119).—Several birds are called by this name in the south of England. One of these is the common Buzzard, which is invariably known as the Puttock in Essex; the others are the Kite (also called the Crotchet-tailed Puttock) and the Marsh Harrier. See Atkinson's "British Birds' Eggs and Nests."—*G. H. H.*

Hawfinch (*Coccothraustes vulgaris*).—I consider myself very fortunate in finding to-day a nest of this rare bird, with five eggs. It was in a yew-tree, within reaching distance from the ground, in a park, about two miles from this town. The bird was in the nest, which is composed of twigs, lichen, and fibrous roots, the interior being lined with dried reed-grass. The eggs, of a pale olive-green colour, are beautifully marked with black spots and greyish streaks. The nest of this bird in our country is so seldom discovered, that the above account probably may not be uninteresting to collectors.—*Fred. Anderson, Alresford, Hampshire, May* 8, 1871.

The Butterflies of Arabia and Egypt.—A very interesting list of lepidopterous insects collected or observed by J. K. Lord, Esq., has been recently published. The localities explored by him had not previously been particularly investigated with a view to ascertain their insect fauna. The region in Egypt which he visited bears resemblance, we are told, to some parts of the Mediterranean coast, and is even not unlike some sandy portions of our own coast-lines. In addition to his investigations of this Egyptian district, and of the Arabian "wadies" and plains, Mr. Lord also examined the African shores of the Red Sea. He reports the following amongst our British species as occurring in the places he visited. The Swallow-tail (*Papilio Machaon*), near Mount Sinai; the Small or Garden White (*Pieris Rapæ*), at Cairo; our exceedingly rare species the Bath White (*Pieris Daplidice*), taken at Wady Gennet and at Mount Sinai; our common and pretty species of *Anthocharis*. The Orange-tip is not recorded, though many species of that genus occur in Arabia: Mr. Lord particularizes nine which he noticed. The Clouded Yellow (*Colias Edusa*) was seen at Mount Sinai; its relative the Pale Clouded Yellow (*Colias Hyale*), observed at Akeek Island, Harkeko, African coast; our conspicuous Red Admiral (*Pyrameis Atalanta*) occurs about Cairo, and the allied and very widely distributed Painted Lady (*Pyrameis Cardui*), also near Cairo, and on Akeek Island. The caterpillars were also seen feeding on a species of *Artemisia*. Our Fritillaries, Meadow Butterflies, and Blues are represented by peculiar species of the exotic genera *Idmais, Junonia, Callidryas*, and *Lampides*. The whole number of butterflies noted is sixty-one, out of which the seven above named are British.—*J. R. S. C.*

Sounding Apparatus.—I have for some time been trying to find out some cheap and effective apparatus to obtain specimens of the sea bottom from depths at which an amateur could not work a dredge, except at great expense. I have applied to the most likely makers of such things, and also to the public, through your columns, but can hear of nothing better than the old plummet, with grease

at the bottom. I am told such a thing has often been inquired for; and as I have at last succeeded in making a very simple yet effective plummet, I thought a description of it would interest your readers. The sketch will illustrate it better than a mere written description could. The body A is a tube, made of tinned iron or copper, with a lid at top, furnished with bayonet catches, to prevent it coming off. At the bottom a conical piece of tin, B, with the top of the cone cut off at C, is inserted and soldered to the tube. A ball (I find a common indiarubber ball, such as are sold for

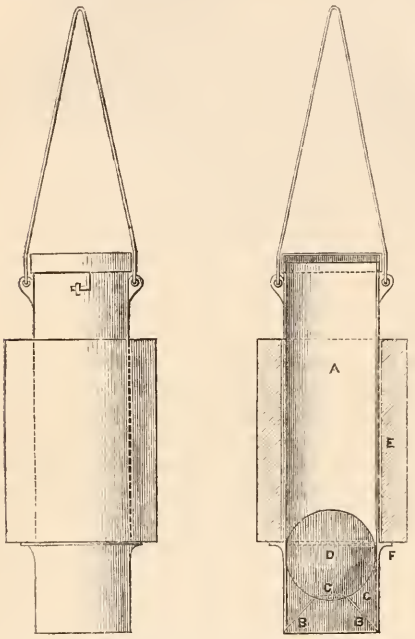


Fig. 72. Sounding Apparatus, with section of same.

children to play with, acts very well, and the cost is only about threepence each), nearly the same diameter as the tube, works freely inside it, and falling on the seating at C, makes a joint. A lead ring E slips on the tube, and rests on the ledge at F. When in use, the sounding-line is fixed to the handle at the top, and the boat being stopped, or nearly stopped, the plummet is let go. On touching the bottom, it should be slightly lifted, and let down gently, to insure it resting right side up. The weight of the lead ring will force the bottom part of the plummet into the mud or sand, which will be forced up inside, lifting the ball D, and flowing through the opening C into the trough G; on raising the plummet, the ball immediately falls back on its seating, and the contents of the plummet are brought to the top. I tried it last summer, and never failed to bring up a good specimen, sufficient to find a good many hours' work with the microscope, and the most delicate *Foraminifera*, *Diatoms*, and *Entomostraca* were not only perfect, but alive. My plummet is about eight inches high, four and a quarter inches diameter outside the lead ring, and weighs about nine pounds. It can be made for a mere trifle by any tinman; or it can be purchased from Mr. Highly,* to whom I have shown the idea, and who has undertaken to make them for sale. Of course, for very great depths, the indiarubber ball would have to be weighted a little, as it is obliged to be of slightly greater specific gravity than the water. I venture to hope that this little "dodge" may induce some to enter upon a study yet in its infancy, and, by enabling even amateurs with not very well-lined purses to study the minute forms of life found at the bottom of the sea around our coasts while living, may add something to our stock of knowledge. Since writing the above, SCIENCE-GOSSIP for this month has come to hand, and one of your correspondents has tried to help me out of last year's difficulty. While thanking him for his good intentions, I fear he has little idea of the practical difficulties of the question. If he had to draw his plummet through thirty or forty fathoms of water, he would not find many organic substances in the holes, even if heavy grains of sand would stay in, which I doubt. My aim was to get something so simple, that it could be worked even on a tolerably rough sea, and yet so certain, that the labour of lifting a heavy plummet through the water would not be labour lost.—*C. L. Jackson.*

SPRING VISITORS.—Swallow, April 23rd; Corncrake and Cuckoo, 24th; Blackcap, 26th. The weather very unfavourable at the time, and continued extra cold for several days after their arrival. Yet, notwithstanding all this, their appearance this year is a few days sooner than usual.—*John Sim, West Cramlington, Northumberland.*

INSECT CATALOGUES.—In reply to numerous inquiries for catalogues of insects, we are enabled to state that some copies may still be obtained of Waterhouse's Catalogue of British Coleoptera. Also that a new catalogue of British Coleoptera is in active preparation, and may soon be had of Mr. E. W. Janson, No. 28, Museum Street, London, from whom may be obtained Marseul's Catalogue of European Coleoptera at one shilling (well worth the money), and T. A. Marshall's Catalogue of British Ichneumonidæ. We have already alluded to Mr. McLachlan's excellent Catalogue of British Neuroptera, and Dr. Knaggs's Catalogue of British Lepidoptera. We are informed that all these lists are still on sale, and may be had of Mr. Janson.

* 16A, Great Portland-street, London.

BOTANY.

The Pineapple (p. 117).—It is hardly fair, without having seen the "stamp" which "M. Q. M. C." speaks of, to throw any doubt on his theory as to the early introduction of this fruit; and I cannot help almost wishing, for his sake, that I may be wrong in my view of the matter; for if I were "M. Q. M. C." I should be very proud of an ancestor who, I thought, had introduced to this country so fine a fruit as that which we *now* call Pineapple; and should scarcely thank any officious correspondent for trying to upset my belief. But I suspect that the author of "Fruits of Great Britain" is right, for the following reason. The old herbalists make no mention whatever of the fruit of *Ananassa sativa*. Lyte, who is my great authority just now, as I have a fine copy of his Herbal in the house (borrowed unfortunately), does not describe it. His book was printed in 1578; and, as he speaks of most of the plants that in his time were cultivated only "in the gardens of the curious," and even of some that were imported but "not yet known" in cultivation, he would most likely have heard of the fame of so great a variety as this. But the herbalists *do* make frequent mention of the "pineapple," which three hundred years ago was the common name for the cone of the pine-tree, not only in English, but in the French and German languages. The particular kind of fir which was then called "a pine, *pinus*," as distinguished from "*picea*, the pitch-tree" (our Scotch fir) and "*abies*, firre" (our silver fir), seems, to judge from the engravings, to have been our spruce fir; still, the cones of any kind of fir would, no doubt, be called "pineapples." It seems probable, therefore, that the mode of growth of the pineapple was not misunderstood at the Heralds' College, but that the cones of the fir-tree were intended to be represented. The name has been transferred to the fruit of *Ananassa sativa* from its superficial resemblance to the *original* pineapple; or possibly, because those to whom it was first sent supposed it to be a gigantic kind of fir-cone, as indeed the old names "King Pine" and "Queen Pine" would seem to indicate.—*Robert Holland.*

Veronica Buxbaumii.—A good many localities have of late been mentioned in Science-Gossip, and I may be allowed to add another still further north; viz. Peebles, where it is at present to be found along with other early-flowering species. Lovers of nature would, perhaps, find a visit to Peebles worth while in the summer time, as, within the past few years, one or two specimens of *Deilephila galii* and *Sphinx convolvuli* have been found along with other more common insects, while *Polyommatus Artaxerxes* has hitherto been easily obtainable. Of flowering plants, ferns, and mosses there is also a good variety.—*J. B. L., Peebles.*

A Triple Primrose.—When walking out this morning, I plucked a primrose, of which the following is a description:—Calyx 14-fid, corolla 14-lobed, stamens 14, and pistils 3, two being aduate, and the other solitary.—*S. M., Casterton.*

Gentian (pp. 91, 119).—The name which most nearly corresponds with "*Surge et ambula*," in the emphatic testimony which it bears to the virtues of the plant owning it, is the French "*Casse-lunettes*," "Break-your-spectacles," applied to "*Centaurea Cyanus*. I know of no similar name for Gentian to that given by "R. T.;" indeed, our Gentians are singularly deficient in English names, properly so called. "J. R. S. C." will find that in books it is *Gentiana Amarella*, not *G. campestris*, that is called the "Autumnal Gentian." The name "Yellow Buckbean" is an absurd book-invention, dating from the time when our *Villarsia* was placed in the genus *Menyanthes*, and originating in the notion that every plant must have an "English name;" it is in every way inappropriate, as no one but a botanist would recognize the affinity between *Villarsia* and *Menyanthes*. If "J. R. S. C." means that the nativity or existence of *Gentiana nivalis* "is perhaps doubtful," I may inform him that both are satisfactorily established. Does not Mrs. Watney (p. 116) mean Agrimony (*Agrimonia Eupatoria*), instead of Hemp-Agrimony (*Eupatorium cannabinum*)? "Ground vine" is, of course, a misprint for "ground pine."—*James Britten.*

The Larch Blossoms.—During the spring, the curious and pretty adornments displayed by the larch twigs attract the notice even of those who feel little interest in botany; they have been referred to by Tennyson also, as marking a particular period in connection with the Thrush's song:—

> "When rosy plumelets tuft the larch,
> And rarely pipes the mounted thrush."

Mr. Newman reports, in the "Entomologist," on the *dictum* of Professor Oliver, that these roses in miniature are really the normal female blossoms. This completely upsets the ingenious conjecture started by certain folks, that they were due to the puncture of some insect of the gall-producing family. —*J. R. S. C.*

Borrago (vol. vi. p. 165, &c).—As my difficulty about the reduplicated form of this word has not been cleared up to my satisfaction, I give the earliest use of it I have met with. It occurs in Tournefort, "Elémens de Botanique" (1694), vol. i. p. 109, and I presume Linnæus considers this to be the first application of the term to the plant, as he cites Tournefort on p. 141 of his "Philosophia Botanica" (1770).—*R. T., M.A.*

MICROSCOPY.

Bullets in Mounting.—In the last number of Science-Gossip attention is called to the use of conical bullets in putting on covers. I must confess I do not see much advantage to be gained by so doing, since the absence of bubbles in that mode of action must be a matter of chance. By using fingers, forceps, or needle, a sight is obtained of the object during the whole time of mounting, and failure is immediately detected. I have used Enfield rifle bullets for applying pressure during the hardening of cement or balsam; but the Enfield bullet can hardly be applied as above, owing to the hollow in its base. I fancy Dr. Dick must have taken his statement from an old French work on the microscope by M. Joblat, published in 1718, under the title of "Descriptions et Usages de plusieurs nouveaux Microscopes." The work has many copper-plate engravings, including that of "the fine mask, with cherclure, in the exact form of a human face." Your correspondent may judge by the plates therein given of some rotifers how much trust can be placed in M. Joblat's assertion.—*B. Daydon Jackson.*

Fish-tail Hairs of the Humble Bee.—Have any of your readers ever noticed the fish-tail hairs on the leg of the Humble Bee? If not, permit me to call your attention to a form which seems to me very curious. First, catch your bee. A good impromptu way of doing this is to watch a bee, till he (more properly, *she*) settles on the ground, or pries into a hole in the soil, and then throw your handkerchief over the spot. The bee will soon buzz up, and make a *ballon monté* of your bandana. Give him more silk, and then constrict below, to cut off his retreat. He may object to this by his peculiar mode of veto,—to wit, his sting. But this will not be altogether without advantage; for there is a popular notion that the Humble Bee has no sting; and if the operator's finger for the next two days at all resembles mine, he will not readily forget this point of Natural History. On reaching home, you open the handkerchief, bee flies to window, you put a wide-mouthed diatom-bottle over him, slip a card between the mouth of the bottle and the window-pane, add chloroform to your taste, and Bombus is ready for the next operation. With a penknife scrape off the hairs that grow on the outside of the tibia (the joint next to the brush): they will probably adhere to the knife-point in a cluster, but may be separated by putting a small drop of water on a slide, and then distributing them in it with a needle. Mount some dry and some in balsam, for each method has something to show. Here is a rough sketch of what I make out with a Ross's sixth. The hair is round, or nearly so, till close to the apex, but not smooth, for the surface seems to be ribbed spirally. There is a medulla, best seen in the balsam. But the curious part of the hair is the tip, where it thins away, and spreads out in the form of a fish's tail; a form that it further resembles in being marked with delicate striæ running to the edge like a fan. There is also a sort of angular mark, of which the open end is towards the apex, and the point towards the shaft. The thinned

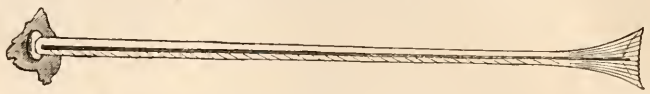


Fig. 73. Fish-tail Hair of Humble Bee.

portion is quite hyaline, but the shaft is brown. The hyaline tips of these hairs may be seen with a low power (about forty diameters) like little bright specks all over the tibia, and a few on the femur. Hairs of analogous form appear on the tibia of *Apis mellifica*, but, of course, much smaller.—*H. B., Woolwich.*

Scale of Common Carp.—In furnishing towards our series of the scales of the British freshwater fishes, the figure of the scale of the Common Carp, we must ask our readers to compare this scale with

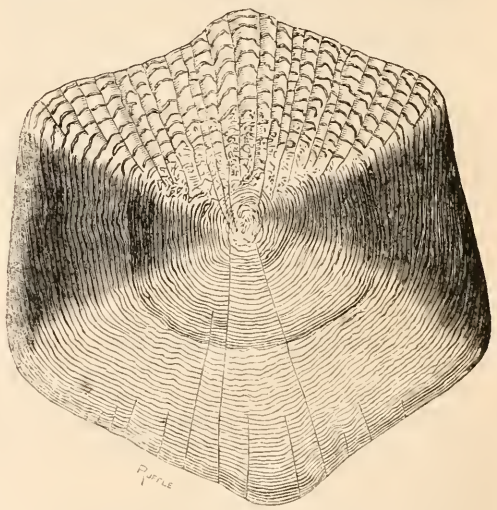


Fig. 74. Scale of Common Carp.

those of the Crucian and Prussian Carp, already figured, and they will observe that it differs much more from either than those differ from each other. It is a very beautiful and characteristic scale.

Pollen for Microscope.—Those who desire to mount pollen for the microscope should specially direct their attention to the Composite and Malvaceous plants.

SOCIETIES.

South London Microscopical and Natural History Club.—Meetings held at Glo'ster Hall, 6, Glo'ster Place, Brixton, S.W., on the third Tuesday in each month. President, Henry Dean, Esq., F.L.S., F.R.M.S., &c. The objects are—First. To enable microscopists and lovers of Natural History, residing in the district, to meet and interchange communications and specimens at stated intervals; to exhibit objects likely to prove interesting to the members and visitors; to promote the acquisition of skill in the use of the microscope, and an acquaintance with the manifold beauties of nature, which, invisible by unaided vision, are so marvellously revealed by our modern instruments. Second. By lectures and papers, to afford instruction to the younger members in the use of the microscope and preparation of objects, and to develop a taste for the study of Zoology and Botany. Third. By occasional excursions into the country around, to investigate the natural productions of the district, and procure fresh materials for observation, which eventually may lead to the formation of a cabinet and herbarium, illustrative of the indigenous Fauna and Flora of East Surrey. Annual subscription, ten shillings. The Hon. Secretary is Mr. F. Hovenden, 63, Angell Road, Brixton.

Quekett Microscopical Club. — Meetings held, by permission of the Council, at University College, Gower Street, on the second Friday in each month for the exhibition of microscopic objects, and mutual gossip on microscopical subjects; and on the fourth Friday in each month for papers and discussion. President, Professor Lionel S. Beale, M.B., F.R.S., F.R.M.S., &c. The objects are thus stated in the original prospectus:—The want of such a club as the present has long been felt, wherein microscopists and students with kindred tastes might meet at stated periods to hold cheerful converse with each other, exhibit and exchange specimens, read papers on topics of interest, discuss doubtful points, compare notes of progress, and gossip over those special subjects in which they are more or less interested; where, in fact, each member would be solicited to bring his own individual experience, be it ever so small, and cast it into the treasury for the general good. Such are some of the objects which the present club seeks to attain. In addition thereto it hopes to organize occasional field excursions, at proper seasons, for the collection of living specimens, to acquire a library of such books of reference as will be most useful to inquiring students; and, trusting to the proverbial liberality of microscopists, to add thereto a comprehensive cabinet of objects. By these, and similar means, the Quekett Microscopical Club seeks to merit the support of all earnest men who may be devoted to such pursuits; and, by fostering and encouraging a love for microscopical studies, to deserve the approval of men of science and more learned societies." Excursions on alternate Saturdays. Annual subscription ten shillings. The Hon. Secretary is Mr. T. C. White, F.R.M.S., 32, Belgrave Road, S.W.

North London Naturalists' Club meets at the Priory Schools, Upper Street, Islington, on the fourth Thursday in each month, at eight o'clock, President, W. Hislop, Esq., F.R.A.S., for the reading and discussion of papers, &c. Excursions are organized during the summer season, of which due notice is given to the members. There is also a Book Society in connection with the Club, limited to members living in the vicinity of the place of meeting, to which the subscription is eight shillings per annum. The annual subscription to the Club is five shillings, without entrance-fee. Honorary Secretary, Mr. J. Slade, No. 100, Barnsbury Road, N.

Croydon Microscopical Club, established April 6th, 1870. President, Henry Lee, Esq., F.L.S., F.G.S., F.R.M.S., &c. Meetings held at the Literary and Scientific Institution on the third Wednesday in each month. The objects of the club are the discussion of subjects connected with, or dependent upon microscopical research; the exhibition and exchange of microscopic objects and preparations; and the promotion of the study of microscopy and natural history generally, and especially the natural history of the neighbourhood and of the county of Surrey. With this latter object in view, the Croydon Microscopical Club cultivates the most cordial relations with similar societies, and negotiations are under consideration for concerted and united action with many such clubs and societies in furtherance of the objects for which they were instituted. The present number of members is 135. The annual subscription is ten shillings, and the Honorary Secretary is Mr. Henry Long, 90, High-street, Croydon.

Old Change Microscopical Club.—This society was instituted for the benefit of the young men in Messrs. Leaf, Coles, & Co.'s establishment, and is not, so we are informed, open to the general public for membership.

Quekett Club Excursion Dinner. — The annual dinner of the excursionists is fixed for the 22nd of June, and will take place at the Swan Inn, Leatherhead. Tickets and particulars may be had from any member of the Excursion Committee.

NOTES AND QUERIES.

Borax and Cockroaches.—I see in last month's Science-Gossip a note relative to borax and cockroaches, as reprinted from the "Journal of Applied Science." I saw the same note in March last, in the "Pharmaceutical Journal," as an extract from the "New York Druggists' Circular." It may interest some of your readers to know, that as to "there being something peculiar in smell or touch which is certain death," having tried it, I did not find it so. I caught a large cockroach one night, placed it in a glass, from which there was no chance of escape, then covered it in borax and left it for the night. Next morning, instead of being stupid or dead, it was as lively as ever, and had cleaned off most of the powder. Knowing cockroaches are fond of sweets, I mixed some with honey, and laid it about, without finding any perceptible diminution of their number. Some of your correspondents may be induced to make further use of the borax, for if of any use, it would be a desirable "Killer." —*C. W. H. Andrews.*

Earthworms.—Perhaps the following extract from one of Mrs. Loudon's works on gardening may prove useful to your correspondent. She says—"The common earthworm (*Lumbricus terrestris*) is a most destructive creature in flowerpots; it has been ascertained that worms swallow earthy matter, and that, after having deprived it of its nourishing properties, they eject the remainder in the form of what are called worm-casts, and which instinct teaches them to throw out of their burrows to the surface, that they may not be in danger of swallowing it again. To find fresh earth, the worm is continually incited to penetrate the ground in different directions; while, after each repast it is induced to return to the surface to eject its cast; and thus ground inhabited by worms is sure to be perforated and pulverized." I may add that the best way to destroy them when they disfigure the surface of a lawn, is to scrape off the castings, and then, if the surface be watered with lime-water, all the worms will die. However, the propriety of this proceeding is considered doubtful, because the common earthworm by its borings renders the substratum somewhat like a sieve, and thus affords excellent drainage. If it were not for them, lawns would long continue swampy after heavy rain.—*J. S. William, Durham.*

Foulkes's Cement.—There is a fluid cement coming much into use for domestic purposes, called "Foulkes's Cement," which seems to be very valuable. It does not seem, so far as can be judged from colour or smell, to contain any of the cements commonly used by microscopists, either those applied with heat or without it. None of those cements is nearly so easy or convenient to work with. Perhaps some of your practical correspondents would be kind enough to give their opinion whether it could be relied upon for the purposes of microscopists—in the place, for example, of marine glue. I find it succeeds with broken plates, on which marine glue always fails in my hands, apparently from not getting a proper surface to catch hold of. If it could be depended on as a general cement for cells, &c., it would be a great gain, being quite as easy to work with as common gum.—*S. L. B.*

Tea-chests.—Can any one tell me of what tree or trees these, say China, boxes are made?—*J. H. L.*

Earthworms.—If Mr. Wilkinson will use the following, he will get clear of the worms:—Dissolve 1 oz. of corrosive sublimate in 2 oz. of hydrochloric acid; put one or two table-spoonfuls into the can full of water; stir well with a stick, and use. The worms will come out and die; pick them up, and put out of the way of any fowls, it being a strong *poison*. It will not injure the grass. Mr. W. must not use it in the *kitchen garden*.—*E. Winder, Lancaster.*

Anemone Infusoria.—I have not seen Dr. Dick's treatise on the "Teleseope and Microscope," referred to by "W." in the last number of Science-Gossip; but I should imagine, he only states that an animalcule of the kind described is *said* to be found in the anemone infusion, the authority for which is Joblot's "Observations d'Histoire Naturelle faites avec le Microscope," 1754, who (at part 2, p. 57) says, "La nature qui se plait à diversifier ses productions, et qui se fait admirer dans tous ses ouvrages, continue à nous en donner des preuves dans cette infusion d'anémone, préparée à l'ordinaire avec de l'eau commune, puisqu'au bout d'environ huit jours on aperçut dans une goutte de cette infusion un animal nouveau. Tout le dessus de son corps est couvert d'un beau masque bien formé, de figure humaine, parfaitement bien fait." And a figure, representing this human face with six legs, will be found at plate 6, fig. 12.—*F. C. S. Roper.*

Tritons.—In Science-Gossip for this month (May) E. Halse, of Notting Hill, wishes to know if *Triton cristatus* really does feed on *Lissotriton punctatus*. Some years since I caught several specimens of these reptiles in the ponds on Wimbledon Common, and kept them in a large glass tank full of water, and have often seen the *Triton cristatus* seize the *Lissotriton punctatus* by the head, and swallow it whole, without any apparent difficulty, the latter offering but little resistance to the operation. The meal seemed to satisfy the *Triton* for some days.—*Alfred Woodforde.*

Water-Snake.—There is a sort of *fish* (I suppose) found in springs here; it is about a foot or fifteen inches long, and about as thick as a stout horsehair, called here a "water-snake." I should be obliged if some one would kindly tell me what it is. The common belief here is, that it is a horsehair come to life; and that if you put horsehairs from the mane or tail into a spring, in about a fortnight they will come to life; also, that there is a strict law, with heavy penalties, against any one putting horsehair into springs. This may interest some collector of odd superstitious.—*W. C. P., Whitebrook, near Monmouth.*

Cotswold Lion (Science-Gossip, May, 1871, p. 114).—Cotswold Lions. Sheep. "Have at the lyons on Cotsolde," Thersites, ap. Collier, ii. 401. "Halliwell's Dictionary."—*W. W. King.*

The Lotus.—"A. H. A." should consult "Illustrations of the Lotus of the Ancients and Tamara of India," by R. Duppa, LL.B. London: printed by Bensley and Son, Bolt Court, 1816.—*C.*

Cammocke (p. 114).—Halliwell gives the following explanation of this word:—"Cammock, a crooked tree or beam; timber prepared for the knee of a ship. 'As crooked as a Cammocke.'—*Mother Bombie.* 'Though the *Cammock*, the more it is bowed the better it is; yet the bow, the more it is

bent and occupied, the weaker it waxeth.'—*Lilly's Euphues.*" The meaning of the quotation is thus appareut.—*Robert Holland.*

Hornet Sting.—Reading an old number of your periodical (January 1st, 1868), I met with the following remark relating to hornets:—"Fortunately the family has received but little or no anuoyance from these pugnacious, and often malignant creatures." Now, hornets are very common in this district: last year we captured a score or more in the house. The people of the district express great horror of them, but fail to give me a reason for it; as, when I ask them (aud I have inquired of many) if they have ever heard of any oue being stung by a hornet, the universal answer has been, "No." Perhaps some one of your correspondents, whose experience has been less satisfactory, will give some information as to the effect of the sting of the hornet, as compared with that of the bee or the wasp.—*Edmund Tonks.*

Dolomitic Conglomerate.—Your correspondent in the April number, writing about the fossils in the "Dolomitic Conglomerate," near Frome, has evidently been working in that remarkable pebbly conglomerate, which Mr. Charles Moore defines to be of Rhætic age. As he is apparently unacquainted with Mr. Moore's valuable researches in that neighbourhood, allow me to refer him to a paper on the "Abnormal Conditions of Secondary Deposits when connected with the Somersetsihre and South Wales Coal-basin," *Quart. Journ. Geolog. Soc.*, vol. xxiii., where, at pages 488–90, he will find his questions answered, and a good description given of those instructive sections in the Vallis.—*H. H. Winwood.*

The Name Pine-Apple (p. 114).—There is little doubt that the original "pine-apple tree" was *Pinus sylvestris;* and that the Ananassa took the name from the resemblauce of its fruit to a fir-cone, aided perhaps by the belief that it, too, grew upon a tree. Parkinson speaks of the "West Indian delitious Pines," as being "like to a cone of the Pine-tree, which we call a Pine Apple for the forme;" he also says, "The Spaniards aud Portugalls call it Pinas, from the likeuesse, and so doe most countryes, following that name." (Sec *Theatrum Botanicum*, p. 1626, for other matter bearing on the subject.) Fir-cones are referred to as "pine-apples" in "Good Words for the Young," 1869, p. 344; and Halliwell gives "Fir-apples" and "Deal-apples." From North Yorkshire I have "Berk-apples." Of course, "Apple" is a general term for a fruit, as "Apples of Sodom," "Love-apple;" and it is even applied to objects which are not fruit, although resembling them, as "Oak-apple."—*James Britten.*

Awbe: Acanthis (p. 119).—I am no ornithologist, but I think I have seen the former name applied to the Bullfiuch in some old work. Is not "the Byrde Acanthis" likely to be the Goldfinch?—*James Britten.*

Naturalist's Dredge.—I shall be glad to know where and at what price a naturalist's dredge can be obtained.—*G. H. H. How, Foster-lane, Cheapside.*

Gentian (pp. 91, 116, 118).—My query was simple,—is there an English equivalent for the "Surge et ambula" of Linnæus? (p. 91); whereas my respondents run off into the virtues of Gentian and allied plants,—information to be found in Lindley and Moore's "Treasury of Botany" under *Gentiana*, and elsewhere.—*R. T., M.A.*

A Budget of Queries.—Will any of your readers have the goodness to inform me where I can find any researches on the following subjects?—1. Growing flowers under glasses of different colours. 2. On the effects of placing full-blown flowers in the dark. 3. On the restoration of faded colour on silk, or other materials, by placing them in darkness. 4. On the change of colour in certain animals in winter. 5. Any experiments *demonstrating* the effects of sunshine on a common fire. 6. On the phenomeua resulting from examination of the blind fish in the river of the Mammoth Caves of Kentucky. 7. Some years ago Professor Daubeny, of Oxford, made some experiments on vegetables placed under coloured glasses; aud about the same time I made some on the colonrs of flowers, with a different object. I dare say all the subjects to which I have referred have been examined, but I caunot find where.—*G. J. W.*

The Descent of Man ("C. E.").—This correspondent, opposed though he may be, and honestly, to the Darwinian theory, should not forget that abuse is not argument; and that, if he really feels himself competent to break a lance with Mr. Darwin or his disciples, he must first of all *read* the "Descent of Man" carefully; and then, not forgetting that his opponent is a gentleman, aud one of very considerable attainments, he may proceed to the attack in the spirit of a gentleman. Whether we are prepared to accept Darwinism or not, we should certainly decline, eveu as a strong opponent, to insert such a commuuication. If "C. E." desires to succeed as a controversialist, he must learn to conquer the temptation to indulge in personalities. Once for all, we may as well state that, although we have no desire to give up space to such a lengthened controversy as this subject of the "Descent of Man" would involve, we should not offer the slightest objection to, but rather welcome, a thoroughly logical and gentlemanly refutatiou of the theory, if any one thinks that such a *theory can* be disproved. If it were such au easy matter as "C. E." supposes, he may rely upon it that the conflict would not be left to him.

Earthworms.—My own little garden and lawn was, last year (like that of your correspondeut in your last number, "H. E. Wilkinson"), so infested with earthworms, as to be a source of great trouble and annoyance to me. I am uow comparatively free from them, aud would recommend the following simple method of dealing with them. At early morning, or after a warm shower, when they are generally near the surface, mix a small quantity of *corrosive sublimate* with water (about half a gill to an ordinary-sized watering-pot will be sufficient), and well saturate the lawn or path. In half a minute its effects will be seen by bringing to the surface all within its reach. They may be gathered up into some vessel, and their destruction hastened by a good sprinkling of common salt. If they are numerous, as in the case of your correspondent, three or four square yards would be found sufficient to be watered at a time. I may add, that I think the grass of my lawn is rather improved thau otherwise by the operation.—*W. Groombridge, Brixton.*

Bleaching Zoophytes.—I have seen *Sertularian zoophytes* mounted for the microscope, that have been beautifully bleached until white as ivory. Can auy one give a hint of the process? Chloride of lime does not accomplish it; at least I have not succeeded to the extent desired.—*B. W.*

NOTICES TO CORRESPONDENTS.

J. C. H.—The subscription list to the "Handbook of British Fungi" was closed in July last. It will be published complete in a few weeks.

W. C. H.—We should not insert such a paragraph without some less romantic attestation or explanation.

E. L. (Hull) and "Ignoramus."—We insert no queries, unless accompanied by name and address of querist, written legibly.

G. M. G.—*Sphagnum subsecundum.*—*R. B.*

T. R.—*Hypnum molluscum* β *condensatum*, a peculiar form with leaves scarcely curved.—*R. B.*

J. C. D.—No. 1. *Grimmia apocarpa.* No. 2. *Madotheca platyphylla.*—*R. B.*

E. M. P.—See our answer to L. M. C. in last number of SCIENCE-GOSSIP.

H. B.—Nothing very extraordinary in a bird so easily tamed.

A. D. R.—*Flustra membranacea.* Get Landsborough's "British Zoophytes," about six shillings, published by Routledge & Co.

H. T.—So long ago, but we think it was a failure.

H. T. (Oxford).—Try Dulau & Co., Soho Square, London.

A. N.—No. 1. If you mean the "Musk Deer," it is *graminivorous*, like other deer. No. 2. No. No. 3. Conferva in any stagnant ditch. No. 4. We do not think you will be 'cute enough to find truffles.

E. S. We can only recommend a free use of water, chloride of lime, and even of fumigation with sulphur.

R. V. T.—The yellow Lichen is *Placodium fulgens*, Sm.; the other, *Lecidea vesicularis*, Hoffm.—*L. L.*

J. S.—We cannot comprehend your design, the query is so vague.

R. L.—The "Journal of the Quekett Club" (one shilling) may be had of Robert Hardwicke, 192, Piccadilly.

W. H.—It is declared to be *Clausilia nigricans*, sent to Worthing by post.

R. S. H. (Basingstoke).—The shells so very long in hand are referred to *Lymnæa stagnalis*, without doubt, but are a peculiar form.

S. T.—For "Insect catalogues" see paragraph under "Zoology" in the present number.

S. W.—A good quill, a bad cork, some cotton wool, but *not* a shadow of *voltox* came to hand.

F. B.—*Hypecoum grandiflorum*, Benth. A native of Spain and the East.—*B.*

J. F.—It is *Puccinia Buxi.*

T. B.—On bark *Hysteriam angustatum.*

J. A.—On *Gagea lutea* is *Uromyces concentrica.*

F. R. S.—"American Naturalist" may be had of Trübner & Co., Paternoster Row. Price 35 cents a number, or four dollars a year.

T. H.—It would have been satisfactory, perhaps, had you whispered in your clever Toad's hearing your great desire to know why he swallowed a spider.

H. E.—Fossils from the Cornbrash of Peterborough, are the *Serpula quadrata* of Phillips, described in his "Geology of Yorkshire," vol. i. p. 117 (found in the Cornbrash of Newton Dale, Yorkshire). They do not however *branch* as H. E. states.—*H. W.*

EXCHANGES.

SEVERAL *named* species of fossil *Foraminifera* from the Lias of the North of Ireland, for any *good* microscopic objects of equal value. First send list to Wm. Gray, Mount Charles, Belfast.

WANTED, a specimen of *Ophioglossum vulgatum*, for *Asplenium septentrionale* or other fern.—J. B. Lyall, Peebles.

WANTED, B. Land and F. W. Shells in Exchange for others or Lepidoptera.—W. H. Broadhead, Chapel Allerton, Leeds.

Æcidium Violæ, *Æ. ranunculacearum*, *Puccinia umbelliferarum*, and other Fungi, for other objects.—T. Brittain, Park Street, Green Heys, Manchester.

DEUTZIA SCABRA offered for stamped address and any object of interest. Lists exchanged.—Address Dr. Webb, 108, White Rock-street, Liverpool.

LONDON CATALOGUE OF PLANTS, 6th Edition, Nos. 34, 62, 154, 677, 1077, 1255, and others, for any of the following: Nos. 93, 289, 292, 302, 424, 483, 491, 652, 686, 700, 711, 873, 876, 965, 1043, 1047, 1049, 1064, 1095, 1242.—F. A. Lees, Meanwood, Leeds.

LARVÆ or Pupæ of *Orgyia fucelina* for local *larvæ* or *pupæ* or *imagos.*— F. R. S. Salterheble, Halifax.

FOR hair of Vampire Bat and Opossum send envelope and object to E. J. Wilson, 43, Upper Cumming-street, Pentonville, N.

WANTED, *Stratiotes Aloides*, or Water-Soldier, and *Subularia aquatica*, or Awlwort, in exchange for other aquatic plants. Address David Mitchell, Foundry-street, Halifax.

BATRACHOSPERMUM MONILIFORME.—For this alga, send stamp and object (other algæ preferred) to H. M. J. Underhill, 7, High-street, Oxford.

WANTED, the scales of Tench, Chub, Bleak, Carp, Snig Eel and Gudgeon, in exchange for others. Send list to J. H. M. 17, Walham Grove, St John's, Fulham, S.W.

OX PARASITES.—For stamped envelope and any object of interest (seeds excepted)—J. Sargent, Jun., Fritchley, near Derby.

PALATE OF LIMPET (unmounted), send stamped envelope, or anything of interest.—R. H. Alderman, 14, Coal Exchange, E.C.

BRITISH AND FOREIGN SHELLS, for Marine Animals.—Wm. Cash, 1, Clarence-street, Halifax.

BOOKS RECEIVED.

"Third Annual Report on the Noxious, Beneficial, and other Insects of the State of Missouri." By Charles V. Riley, State Entomologist. Jefferson City, Mo.

"Monthly Microscopical Journal." No 29. May, 1871. London, Robert Hardwicke.

"George W. Childs." A Biographical Sketch by James Parton. Philadelphia, U S.

"Land and Water." Nos. 275, 276, 277, 278.

"Journal of Applied Science." Edited by P. L. Simmonds. May, 1871.

"Report of the Fruit-Growers' Association of Ontario for 1870," including the "First Report on the Noxious Insects of Ontario." Toronto. 1871.

"The Gold Yield of Nova Scotia." By A. Heatherington. 1860-70. London: Trübner & Co.

"The Gardener's Magazine," for May, 1871.

"The Animal World," for May, 1871.

"The American Journal of Microscopy." No. 1. April, 1871. E. M. Hale, M.D., Editor. Chicago: G. Mead & Co.

"Crystal Palace Aquarium." Prospectus.

"Notice of a Fossil Forest in the Tertiary of California." By Professor O. C. Marsh, of Yale College.

"On the Geology of the Eastern Uintah Mountains." By Professor O. C. Marsh, of Yale College.

"Description of some new Fossil Serpents from the Tertiary Deposits of Wyoming." By Professor O. C. Marsh, of Yale College.

"Clever Dogs, Horses, &c., with Anecdotes of other Animals." By Shirley Hibberd. London: S. W. Partridge & Co.

"Animal Sagacity." Edited by Mrs. S. C. Hall. London: S. W. Partridge & Co.

"Our Feathered Companions." By the Rev. Thomas Jackson, M.A. London: S. W. Partridge & Co.

"The Canadian Naturalist." Vol. V., No. 3. Sept., 1870. Montreal: Dawson Brothers.

"Memoirs of the Peabody Academy of Science." No. 2. (No. 1 *not* received.) "Embryological Studies on Diplax, Perithemis, and the Thysanurous Genus Isotoma." By A. S. Packard, Jun. Salem, Mass.

"Materialistic Theories: a Lecture delivered in connection with the Christian Evidence Society." By the Archbishop of York. London: Hodder & Stoughton.

"Science and Revelation: a Lecture delivered in connection with the Christian Evidence Society." By R. Payne Smith, D.D., Dean of Canterbury. London: Hodder & Stoughton.

"A Practical Help to Teaching English Composition." By B. E. S. Drake Bigsby, F.A.S.L. London: Thomas Murby.

"Murby's Scripture Manuals: Joshua and Judges." London: Thomas Murby.

"An easy Elementary Course of Latin." Book 3. Conjugation of Verbs. By William Dodds. London: Thomas Murby.

"Catalogus Coleopterorum Europæ et confinium; auct. S. A. de Marseul." London: Janson.

"Notes on Chalcidiæ." Part 2. By Francis Walker, F.L.S. London: Janson.

"American Naturalist," for May, 1871.

"Boston Journal of Chemistry," for May, 1871.

"Report of the Rugby School Natural History Society" for 1870.

COMMUNICATIONS RECEIVED.—F. C. S. R.—G. H. A.—W. A. G.—R. T. A.—J. C. H.—A. W.—W. C. H.—E. W.—J. E. M.—W. H. B.—A. N.—W. H. B.—H. T.—J. S. W. D.—A. J. R.—F. B.—W. W. K.—B. D. J.—E. H.—J. H. L.—G. S.—W. G.—H. B.—E. T.—W. H.—E. M. P.—F. J. W.—J. R. W.—W. C. P.—H. T.—F. B. W.—F. H.—R. H.—J. B. L.—W. H. W.—E. S.—M. J.—T. B.—W. H. W.—G. H. H.—A. H. C.—R. L.—J. S.—S. M.—H. E.—T. B.—E. W.—J. A.—S. W.—J. S.—S. L. B.- J. H.—S. S. (Yes.)—F. A. L.—J. R. S. C.—C. L. J.—J. W. B.—R. V. T.—J. A. B.—J. B.—S. A. S.—W. G.—T. H.—E. H.—R. L.—W. T.—G. M.—H. W.—J. B.—E. W. F. R. S.—W. W.—G. H. W.—M. A. D.—W. M.—C. E.—O. M.—C. J. W. R.—H. W.—W. C.—R. H. A.—A. S.—L. T.—J. L. P.—W. P. M.—D. M.—H. W. H.—M. D. P.—A. H.—S. S.—H. W.—T. G. A.—R. T., M.A.—J. S.—W. F.—J. H. M.—H. M. J. U.—F. G.—S. G.—R. H. W.

THE STORY OF A PIECE OF LIGNITE.

By J. E. TAYLOR, F.G.S., Etc.



PERSONALLY, I do not think I am such a familiar object, in England at least, as some of my fellow story-tellers. In some parts of Germany and Switzerland, and even in Devonshire, I am much better known under the name of "brown coal." The name I have assumed at the head of this story indicates, although under a Latin form, my vegetable origin. Of my affinity to the common household coal I will speak presently. My appearance bears out my Latin name, for few would mistake my mineralized woody structure for anything else than it is. Notwithstanding my dull brownish look, and the general absence of that pitchy glossiness which characterizes true coal, I have been formed under very similar conditions to the latter. My history is not less romantic—nay, in my belief, is even additionally so, on account of my having come into existence at a comparatively recent period, geologically speaking. The epoch of my birth is distinguished by the appearance of many genera of animals and plants which are still in existence. These, it will be seen presently, by their occurrence in other parts of the world besides Europe, indicate the immense amount of physical changes which have caused them to take up geographical stations so far away from those in which they were evidently first created.

The epoch of my birth was briefly referred to by the last speaker. It was the *Miocene* period, during which Europe was dotted by great lakes of fresh water, and covered with a flora more magnificent than any she had been clad with before since the world began. The scanty species of the Carboniferous period pale before the gorgeous varieties of the Miocene. The flora extended to the very North Pole itself! I am speaking of a period when no ice-cap existed in Arctic regions; but when Iceland, Spitzbergen, and Greenland were clad with evergreen shrubs; of a time when the Old World and the New were connected by an extension of land, of which the Japanese islands, the Aleutian islands, and Vancouver's Island are now the only existing outliers. Central Europe alone maintained no fewer than three thousand species of plants! Of these, eight hundred species of true *flower-bearing* plants, besides ferns, &c., are found fossilized in the strata called the "Molasse."

The temperature of this period was considerably higher than it is now, although not near so elevated as in the previous *Eocene* epoch. The nature of the plants found fossilized indicates an elevation of about sixteen degrees above what it is now. Hence with physical circumstances suitable, one cannot wonder that a luxuriant vegetation covered every available spot of the dry land. As to the causes of this increased temperature, and, still more, of the extension of the Miocene forests to the very North Pole itself, I can only speculate. It is generally thought, however, that they were due to astronomical conditions of the northern hemisphere, partly similar to those now affecting the southern, and also to such an arrangement of physical geography as ensured the highest degree of heat and genial moisture. But even these conditions will not account for plants to which *light* is such a necessary stimulant, growing within the Arctic circle, where there is a continued darkness for months together. I must give it up, seeing that eminent scientific men are in a quandary about it. All that I can say is that no *geographical* agencies alone will account for the physical circumstances of the Miocene epoch.

The Miocene strata, as I think I have before

remarked, are most interesting to biologists, inasmuch as it is here that they meet with the most abundant evidences of the direct ancestry of living animals and plants, which, since then, have been distributed by subsequent physical changes over the surface of the existing dry land.

The fossil plants found in the lignite beds where I lay, before I was disinterred by the curious geologist to tell him my personal experience, themselves assist me in unfolding a wondrous tale. Lignite beds, of Miocene age, are to be found in Germany, Switzerland, Italy, Austria, Scotland, Ireland, Devonshire, Iceland, Spitzbergen, Greenland, Vancouver's Island, the Alaska islands, and elsewhere. All the plants forming this *lignite* afford most indisputable proof of their having grown on or near the spots where they are now met with. The petals, stamens, and pistils of the flowering plants are preserved in the fossil state, together with even the pollen! Then you have the seeds, in various degrees of ripeness, whilst the leaves of many of the fossil plants have also fossil *fungi* on their backs, just as living plants are troubled with "smut," "bunt," or "rust" now.

The ferns are to be met with in the circinate, or crosier-like condition, as well as with the ripe spore-cases, ready to burst, on the backs of their fronds. Nothing could be more conclusive as to these various plants, flowering and cryptogamous, having grown near where they are now found in a fossil condition. The facts I have mentioned will show you they could not have been drifted to their present high latitudes by any *flood* or *deluge*, for that would most assuredly have disturbed such minute evidences of local growth as every bed of lignite affords.

Taking this fossil flora in its general character, you will find that it is not so much what you would call *European* as it is cosmopolitan. Of the eight hundred species of flowering plants which geologists have already discovered in the lignites of Switzerland, no fewer than three hundred and twenty-seven species are *evergreens*. The majority of the species found fossil here and in Germany have, since then, migrated to the southern states of North America. The next percentage continued European. Then, in succession, you find other species which have since been transferred to Asia, Africa, and even to Australia. The preponderance of the *American* types, both of plants and insects, is the peculiar character of the Miocene fossils in all the deposits of the old world. That I was perfectly correct in my statement about the general increased temperature of this period will be evident when I submit to you a few analytical facts connected with this fossil flora. You will have to seek for the European types by the shores of the Mediterranean, and for the Asiatic in the Caucasus and Asia Minor generally. The *camphor*-trees—now such a characteristic element in Japanese scenery—are very abundant in the fossil condition in Miocene strata so far north as Iceland, Spitzbergen, and Greenland. How imposing was the vegetable kingdom in Central Europe at this time you may guess by my enumerating a few of the commoner genera.

The *Smilax* grew everywhere, only equalled in abundance by the *Dryandroides*. Nine species of *Fig-trees* are known, whose nearest analogues now flourish in India, Africa, and America. The *Proteacea* family was very abundant. *Fan-palms* were a peculiar feature in the Miocene landscape, together with occasional *Flabellarias*. Other species of *Palm* were not lacking to adorn the scenery with their graceful foliage. Then we had abundance of *Tulip-trees*, *Magnolias*, *Banksias*, *Sequoias*, *Vines*, &c. You may guess, therefore, at the lovely aspect of the Swiss, Italian, German, and English lakes, set in a frame of such lovely vegetable forms, and whose banks were haunted by animals (which I shall presently describe) whose forms and affinities were quite as foreign to anything existing in Europe as can possibly be imagined.

I was exhumed from my silent position in the pretty valley of Bovey Tracey, in Devonshire, where lignite occurs in several seams. There is not that abundance of vegetable forms stored up here as is to be met with elsewhere, especially in Switzerland. As far as I can remember, only about fifty species of plants are known from this English deposit. The intervening beds tell a tale as to the denudation of Dartmoor, and how the overlying beds came to be chipped off the hard granitic boss. Twenty of the plants found fossilized in this my birthplace are common to those met with under similar circumstances in Switzerland. They are principally *Evergreen Oaks*, *Fig-trees*, *Vines*, *Laurels*, *Gardenias*, &c.

Miocene beds are met with also in the Isle of Mull, and at Antrim, in Ireland, where the basaltic columns of your Giant's Causeway are of this geological age. The floral yield of these beds, however, has been very small compared with the same strata elsewhere. A peculiar species of *Fern* grew in what is now the Isle of Mull; but which was, at the time I am speaking of, part of an extended connection with Ireland. The greatest interest connected with these beds is that they contain evidence of the last active volcanoes in the British islands.

The Greenland lignite beds have yielded many hundred species of fossil plants; but their character is hardly so well known as those of other deposits, although it tells the same tale of a mixed flora. The Iceland strata contain no fewer than four hundred and twenty-six species of true flower-bearing plants, exclusive of those belonging to the cryptogamous class. Among them you may find such familiar types as the *Willow*, *Juniper*, *Rose*, *Oak*, *Plane-tree*, *Maple*, *Vine*, *Walnut*, &c., all of them now living

further south, either in the Old World or the New. The reason why the southern states of North America are now occupied by a flora which I have shown you was decidedly *European* during the Miocene period, is that it subsequently migrated thither by way of that continuous land, whose outliers are to be found in the Aleutian islands. They were driven to their present southerly habitats by the gradual growth of the great Arctic ice-cap during the Pliocene epoch, and which, in extending so far beyond its present limits during the Glacial period, caused temperate plants to take up positions even under the equator; but at sufficient heights to find a temperature analogous to that of their northern home. The further you go *east* in the old world, the more numerous relatively are the living species which occur in the fossil in the Swiss lignites. The *Salisburia* is now limited to the Japanese region, although it is found fossil in the Pliocene deposits of North America. There are more than three hundred existing species of plants common to the Southern United States and Japan, than to Europe. So that, in this respect, Japan is more nearly related to the new world than to the old.

I have gone into this detail because, although the vegetable forms which enter into my composition are so like those now in existence, as to suggest a recent geological period, yet their cosmopolitan distribution from European centres, the subsequent depression of dry land to become sea-beds, and the uplifting of sea-bottoms into dry land, and even to high mountains, all proclaim the great lapse of time which must have ebbed away since then! Many of the great fresh-water lakes I spoke of just now, set in their frame-work of a southern vegetation, had rivers and streams which supplied them with water. The *deltas* of such streams are still visible in many parts of Central France. The boughs of the overhanging trees, and the host of leaves which were shed in the autumn time, thickly strewed the surface: gradually settling to the bottom, they there formed those beds of woody lignite of which I form an insignificant part. In some of the Swiss lakes there were precipitations of limy matter going on, and these enveloped the leaves, &c., with thin films of carbonate of lime, so as to preserve every vein, mid-rib, and ornamental marking. The fish, such as the *Roach*, &c., as well as fresh-water *mussels*, which lived in the lakes, have their remains occasionally found in numbers. In Central France there are beds of some feet in thickness actually made up of the accumulated tubes of *caddis-worms!* More than a thousand different species of insects have been obtained from the lignite beds of Switzerland, so that you may guess at the lively sounds which animated these old Miocene woods. Gorgeous butterflies, allied to existing Indian forms, slowly flapped their way through the bosky thickets. Hosts of white ants, or *Termites*, of at least ten species, built their earthy mounds; myriads of insects, of various orders, dropped into these extinct Swiss lakes by millions, poisoned by the mephitic gases which were sometimes evolved in great volume. Among the fossil insects you may recognize forms which mankind now consider *pests*, although they have an antiquity so much greater than themselves. These include the Dung-beetles, Lady-birds, Earwigs, Glow-worms, Dragon-flies, Honey-bees, &c.

I must say a few words respecting the creatures which lived in these magnificent primeval forests. Troops of *monkeys* were not wanting, of which the remains of at least *three* different genera are known. The *Dryopithecus*, or "Tree-ape," lived in France. It was arboreal in its habits, and in stature was equal to a man. In Greece there lived a genus called *Semnopithecus*, and in the forests where the Pyrenees now rise was another, named *Pliopithecus*. Huge tigers (*Machairodus*) haunted the thickets, scaring the light antelopes and deer. Along with the tree-monkeys were species of *Opossum*, not much unlike those now living on the same trees in the United States. Huge *Deinotheria* frequented the marshy swamps—creatures with downward-bent tusks, and, in natural history position, intermediate between the Tapir and Elephant families. The *Mastodon* was the characteristic and commonest type of the elephants, noticeable chiefly for its straighter tusks, and more particularly for the mammillated shape of its huge teeth, which, however, were only employed on vegetable diet. The rivers swarmed with many species of *river* or *wart hogs*, associated with *Hippopotami*, *Tapirs*, &c. Herds of wild *oxen* roamed over the plains, their weaklier members falling a prey to the huge tigers, bears, and hyænas, which had appeared on the stage of creation by this time. The Deer family had also come into existence, and abounded in great numbers. What was said of the mammalia of the Eocene period,—viz., that some of the species combined characters which are now distributed among three or four, is more or less true of many of the Miocene animals. I have mentioned the *Deinotheria* as instances. The *Hipparion*, or three-toed horse—very numerous at this time,—was another, inasmuch as it possessed affinities with the ruminantia. In the Miocene deposits of the Sewalik Hills, in India, the "missing links" are even more numerous: chief among the forms there to be met with is the *Sivatherium*, a huge *four-horned* deer, which connected the ruminant family with the pachyderms. It had a long snout, or proboscis, like the elephant, which creature it nearly equalled in size and bulk. But the most remarkable animal which then lived in India was a huge *Tortoise*, now extinct, whose entire length was over eighteen feet, breadth eight feet, and height over seven feet! I doubt whether

the whole records of geology can bring forth a reptile more peculiar, or built on a huger scale, than this. Associated with it are the remains of several species of crocodiles, which then, as now, lived in Indian rivers. The *Giraffe, Camel*, &c., were then Indian mammals, although they are now limited to Africa. In North America you may find other strata of Miocene age, as in Virginia, Nebraska, &c. Most remarkable are the fossil remains of animals which afterwards became extinct; as, for instance, the Horse, Ox, &c. These active creatures swarmed over American plains at the time I am speaking of, just as the Bisons and Wild Horse now do further south. But the latter have thus run wild since their introduction by the Spaniards, whereas during the Miocene period they were natives of the New World, and lived on the same areas as Mastodons and Elephants.

You will have seen that the peculiarity I mentioned earlier in my story as to the chief feature of the Miocene flora being its extended geographical distribution since it grew so luxuriantly in Europe, applies almost equally to the animals. It seems so strange to imagine native horses and elephants in America, and native monkeys and tapirs in England! But I am speaking of facts about which there can be no possibility of mistake. I have only briefly glanced at the chief vital features of this interesting epoch, but my hearers will admit the world was then anything but a desert, although its most highly-endowed tenant—that which then occupied the place now maintained by man—was only a long-armed monkey!

The familiarity of the animal and vegetable types of the Miocene epoch, and their great resemblance to, if not identity with, species now living, will cause you to think that it was not so far removed in time as it really was. It is only when your attention is drawn to the physical changes which have gone on since then that you grasp the idea of unlimited time more fully. Great mountains have been upheaved from the sea-bottom, and continents depressed to form sea-beds, since the events occurred which I have been describing. It was a period when volcanoes were active in Great Britain, and when, in Central France, they threw up great cones of ashes, lava, and scoria, equal in height to Vesuvius or Etna! The Alps, Pyrenees, Himalayas, Andes, and other great mountain-chains, were then either not elevated at all, or much below their present loftiness. The area of the Swiss fresh-water lakes and of the dense Miocene forests became gradually depressed, until it was a sea-bed, tenanted by hosts of marine mollusca, fish, cetaceans, &c. This great change took place even within Miocene times, for the marine deposits just mentioned belong to the uppermost division of the formation. I cannot speak of the great changes which subsequently swept over the northern hemisphere, of the formation of the great Arctic ice-cap, which spread over temperate latitudes, and drove animals and plants as from another violated Eden, this way and that, until they ultimately occupied their present habitats! All this is matter of fact, as well as matter of geological history; but a poor piece of *Lignite* cannot be supposed to remember everything that took place since it was born!

"MARCO POLO" OPOSSUM.

OUR range of pets here in England is generally very limited. Our cats and dogs, squirrels, dormice, guinea-pigs and rabbits, meet us over and over again at almost every country home. But once I had a real stranger, common enough in his own country, but not often domesticated in this—"Marco Polo," an Australian opossum. Not really an opossum, that term is properly confined to the American opossums. My opossum was a "vulpine phalangist," but "opossum" is certainly the name by which he and his very numerous relations are known in Australia.

A few years ago a friend returning from a short stay in Australia brought home with him a fine opossum and a piping-crow: the former was presented to me, and became my especial darling and my care. I named him Marco Polo, being, as he was, a traveller; but his early history was not particularly clear. My friend had been staying at Warnumbool and had there procured three nice little opossums, ready to take back to Melbourne, and so home. These little creatures he placed in an empty garret; their propensity for eating up all things within reach had been well considered, and everything but suitable food carefully removed. The games of these little fellows were very entertaining to watch; and one evening after witnessing the performance as usual, my friend most unluckily left behind him a box of sulphur matches. The next morning all three animals were found to be seriously ill, and the matches had disappeared. One opossum alone recovered, was taken to Melbourne, and let loose in a comfortable wire habitation at one of the hospitals where my friend was staying with the principal surgeon. The day came for the commencement of the voyage. The crow was packed in a hutch, and another hutch, a very small one, was destined for the opossum. It was placed in the large enclosure and my friend and the doctor stood waiting to see him enter it, being both a little nervous of touching the animal. Vain hope. Master 'possum was not quite so green as all that. The cab had come, the luggage and the crow had been hoisted up, not a moment longer must be delayed; with real regret must I relate it, but my friend, who had doubted the kindly nature of the in-

nocent opossum, seized a big stick, and caught the poor fellow a hard crack on his beautiful head, rendered him nearly senseless, and popped him into his hutch. He arrived on board without further adventure, and was given over to the cook to take charge of. The crow, who had left off piping and taken to imitate the fowls during his stay at the hospital, was carried from his cab to the ship by an imprudent porter, who put his hand through the bars of the hutch to lift it. He dropped it with a sudden crash! The crow had driven his sharp hard beak well into the flesh of his fingers. There were two other opossums on board ship, and all the pets were under the charge of the ship's cook. One opossum got away and was missing for two or three days: at last he was found under the galley fire amongst the ashes; the poor thing had felt the cold severely. A death occurred in the trio; my friend had suspicions that the deceased was *his* opossum who had suffered the crack on his poor head; but the cook affirmed that it was not so. Anyhow at the end of the voyage a very large and very tame opossum was shown as my friend's, and taken away by him. A faint idea existed that the real owner of that opossum would not have been so likely to fee the cook as the cook considered my friend likely to do; but certainly the creature that was brought to me was full-grown, gentle, domesticated to a degree.

In some houses in Australia they live and run about like tame cats, and had I not been so afraid of losing him, or of dogs touching him, I believe I could have allowed Marco to do the same. He and the crow were left at our little country station for a short time till they could be fetched; their fame very quickly spread, and visitors came down to the station to see the two foreign creatures. The hutch was carried into our yard, and I eagerly proceeded to examine my possession. I saw a cramped, dirty little hutch, and behind the bars a soft, grey creature, about as big as a large cat, only broader. It had a pointed face, with cat-like furry ears, and two dark stripes upon its head; its colour was a rich light grey, with a reddish tinge about the head, and dark brown tail. It had a dark stripe on its yellowish breast, and what pleased me most were its eyes. Soft, wistful eyes, of a dull reddish-brown; eyes that pleaded for kindness and sympathy, dreamy pathetic eyes, gentle, far-seeing eyes. This was the impression they gave me when, as it often did, the creature put its two little black hands on my arm and gazed up into my face; but in reality I think the expression was partly caused by the fact of Marco scarcely seeing at all by daylight; but as darkness came on his nocturnal habits came strongly upon him, and he would tear and race about his cage, and his eyes would shine like little lamps.

At our first interview I was informed by my friend that the opossum was savage and dangerous, but I could not believe it of a creature of such gentle aspect; and as it happened, his appearance did not belie him. I put on a pair of thick gloves, opened the hutch-door, and lifted Marco out, he offering no resistance beyond clinging to the sides of his nasty old house with his long, sharp claws. His little hands were beautiful, and he had full fur "bishop" sleeves down to the wrist, which were exceedingly neat and pretty; his tail had only fur on the upper side, beneath it was black, hard skin; it had a sort of finger-like point, to assist his prehensile habits. I put him in a good-sized house, and gave him a collar and chain, so as to let him have tolerable liberty. Now and then he had a scramble about a room in the dusk, and wonderful it was to see him climb and twist about the furniture. He was an object of interest and curiosity to our visitors; but I grew very tired of always hearing over and over again the visitor pronounce with a satisfied and witty air, "Oh! 'possum up a gum-tree,' I suppose." No matter who came, or to whom I mentioned my opossum, I was nearly sure to hear the same little joke given out, as if a happy and original notion.

His diet was a matter of some anxiety to me at first; ship biscuit was the only provision I could find in his old house.

I visited the Zoological Gardens with a letter of introduction to Mr. Bartlett, the superintendent, who kindly took me to the opossum cages, and I had an interview with their keeper. There were plenty of the pretty creatures there, and they increase only too rapidly. I finally kept Marco Polo on bread, which he liked exceedingly, carrots, boiled potatoes, and any vegetables and fruit he seemed to like. The opossum is said to eat animal food, such as small birds, but I kept only to vegetable diet, bread being the standing dish. I went to see the opossum at the Crystal Palace, he seemed to lead a dull life, asleep at the back of his hutch; he was fed entirely on boiled potatoes.

My first business every morning was to look after Marco Polo, and pet him and talk to him. We were living in a very pretty, little country-house, grown over with creepers, standing on a terrace with a lawn sloping down to a wood. Under a tree on the terrace was the piping-crow's wicker cage, and near him was the opossum. They both came into the conservatory at night, and had broken several pots of flowers between them. The crow's name was "Friday," he belonged to one of my younger sisters. We had a very engaging and beautiful little kitten called "Joy." Joy's pleasure was to climb up the trunk of the tree against which Friday hung, and dodge him round and round it. Friday would take aim with his sharp beak, and snap and peck at her or any bit of her tail or paw that came within his reach. The tree was a may-tree, and came out

a mass of lovely blossom. We used to sit out on that pleasant little sunny terrace and watch the creatures. I had two very tame dormice, whose little house stood on the top of Marco's, but they were as much out of their house as in it. Marco grew daily more gentle and affectionate. He slept most of the day curled up in a fine furry ball. If I waked him, he would look up with a reproachful gaze and roll up again still tighter. I enjoyed his gentle society all that summer, and in the autumn we returned to town. Marco came too, his home was on the leads outside the dining-room windows.

For some time we did very well; with his chain he could have a scramble about the leads and steps (to the interest occasionally of the next-door neighbours). I covered him up with carpet as the cold weather approached. Winter came on. I began to fear whether Marco Polo's constitution would stand the cold and damp. I tried to find a home for him with friends who might keep him in a stable or warm covered place. However I failed, and after much deliberation I wrote with regret to Mr. Bartlett, and asked if he could receive my poor dear opossum into the Zoological Gardens. He most obligingly let me know at once that he would do so, and said that in the course of a few days he would send for Marco. I felt the idea of parting with a creature so pretty and so endearing very keenly. I was afraid to go out lest he should be fetched away in my absence, and spent a day or two in feeling very "low" upon the subject. We had poor Marco Polo in to breakfast, and he ran up the dining-room curtains and at last got into the coal-scuttle, from whence I had to lift him. I had heard accounts of a fine equipage belonging to the Gardens and drawn by zebras; I had vague hopes that these gaily-striped creatures would come trotting down our quiet street, and stop at our door. I was disappointed.

One morning a kind-looking quiet man asked to see me. He was the keeper of the carnivora, at present disabled by a wound on his arm given him by the bear. He produced a little sack, in which were many brass eyelet-holes to admit the air. I bade farewell to Marco Polo. He was coaxed and persuaded into his sack, the end was tied up, and, slung over the keeper's shoulder, he made his undignified progress to the Regent's Park. Soon afterwards I paid him a visit. There had been no room for him in the opossum-house, and I found him chained up in a corner behind the cases in the snake-house. I took him in my arms and gave him some sugar I had brought; he appeared very well and happy and was very fat. He was the means of our seeing and experiencing many amusing things in connection with the snakes, the keeper being a very good-natured one.

Once or twice afterwards I saw Marco. The last time about a year ago, he was then in first-rate society, being in the same cage as the Duke of Edinburgh's opossum, and the happy possessor of a wife and a flourishing young family. No wonder with these attractions Marco Polo had forgotten me; I think he had. The keeper would not vouch for his being tame, but I ventured still to stroke his beautiful thick fur and hold his hand in mine, and he looked up at me in the old way, but I do not think he knew me. Since then I am rather uncertain if there has not been a clearance of some of the opossums, and whether Marco is not gone off somewhere else. The name of his old possessor no longer hangs on the cage. A pleasanter, tamer pet than a domesticated vulpine phalangist no one need wish to have. M. A. D.

THE SONG OF BIRDS.

IN your April number is an extract from Mudie, proposing a question as to what precise purpose is served by the song of birds. I conceive that, unless our eyes are filled with the dust of Darwinism, we will not have to search far for an answer. The song of birds is an arrangement of nature—one of a great class—which, as far as we can see, serves no purpose of direct utility. The Author of Nature has not only provided abundantly for the utilities, but has also been lavish in decoration. All nature is rife with pleasing sounds, from the brief song of the Robin, or the gentle sighing of the summer breeze, to the grandeur and majesty of the pealing thunder. Nature's delightful painting rejoices the eye, and a thousand fragrant emanations regale the nose. It has been beneficently contrived that those things which are necessary to our existence also minister to enjoyment. Not only so, but many things exist for no purpose, unless it be to confer pleasure on living beings, and to display the character and resources of the Creator. What kind of world would this be, devoid of all the *unnecessary* variety and elegance that surrounds us on every hand. One would scarcely feel any reluctance to leave such a world. I do not mean to say, however, that things created merely for the enjoyment of sentient beings are of no use. Our whole nature is modified by our surroundings. Objects of beauty, when appreciated, not only have a refining influence on the mind, but they render us cheerful and joyous. I never met a morose naturalist. He who has eyes to see, and a heart to admire the charms of nature, will never become so far depressed in spirits as one who has not learned to enjoy these beauties. Those influences of nature that are only æsthetic, though less obvious, are not less real than those that are material. Physiologists are well aware of the connection between mental conditions and the physical state of the body. Thus it is true in a sense other

than the primary one, that "man shall not live by bread alone." And, further, I would not be so egotistical as to conclude that man alone was benefited by those things that minister to our enjoyment. The psychological state of animals is almost unknown to us: birds, however, appear to enjoy the brilliance of the summer sun more than its warmth; and we may reasonably conclude, that as the lower animals partake, to a certain extent, of the same nature as man, so they may also in some degree partake of his enjoyments. The song of birds has a value. It is not, however, a necessity for the species, nor can it be classed along with such things as the functions of the liver, any more than can the gorgeous colours of a summer sunset, or the rich tints of the rose.

Belfast. S. A. Stewart.

PRESERVATION OF SPECIMENS.

In one of your recent numbers I see that a correspondent entertains some doubts as to the efficacy of camphor as a preservative of insects and other objects of natural history. I have long ceased to have any faith in either camphor, turpentine, naphtha, or any other atmospheric poisons as an antidote against the ravages of the larvæ of the clothes-moth, or any of the numerous acari which attack dead animal matter, and which make such fearful havoc amongst our far-sought and highly-prized treasures, whether insects or birds. I am quite of opinion that they are mere quack nostrums, unavailing in every sense for performing the duty for which they are applied; nor are the more potent mineral poisons—arsenic, corrosive sublimate, &c.—much more efficacious when applied to the individual animal itself, whether as dry powder or spirituous solution. I have frequently used the solution of corrosive sublimate to the feet of birds, to the heads of the wings, where there is a difficulty of removing the entire of the muscular matter in skinning, to the fur of quadrupeds, particularly about the feet, and in every case without perfect success; for sooner or later the ravagers resumed their labours, even where the mercurial salts in minute crystals were visible, after the evaporation of the spirit. The late Charles Watertou lays down corrosive sublimate as a perfect panacea for all the evils which surround museum specimens, but I feel certain from actual experience that there is more of poetry than fact in that talented naturalist's doctrine,—a quality which more or less pervades much that he has written. A fact came under my notice only some few weeks ago going far to prove the utter worthlessness of camphor as an atmospheric poison. I had a few store boxes of insects—coleoptera, orthoptera, and lepidoptera,—some of which I had wandered for in the valleys and plains of Chili and Peru, and the forests of Central America and Mexico. They had kept exceedingly well for a number of years, and about twelve months ago I took them all out, cleaned the boxes, relined them with fresh paper, and placed amongst them any quantity of camphor; my surprise may therefore be imagined, when, on opening them about a month ago, to find them utterly destroyed, the different orders had all suffered alike, and were all in one common ruin. The larvæ of some (to me) unknown moth, from three-quarters to an inch in length, were pursuing their labours with a zeal highly praiseworthy—had it been in a better cause. The soft and edible portion of beetles was entirely consumed, and corslets, elytra, heads and legs, were scattered about, amongst the similar remains of crickets, locusts, and mantes, &c., and the wings of butterflies drawn up into pupa-cases of the silken secretion of the spoilers. They were labouring away in active contact with pieces of camphor. Some Camberwell Beauties I obtained in Northern Spain, I had taken the precaution to saturate with the solution of corrosive sublimate; they, however, had shared the common fate. For many years I have been annoyed in my collection by the depredations of the grub of the common clothes-moth, but these were exceedingly small, seldom more than a quarter or three-eighths of an inch; but these I have now to complain of are, as I said before, when extended, nearly an inch. Can any of your collecting correspondents give me an idea what they are, or if they "bear a charmed life"?

In the same room where the unfortunate duplicates were stored I have a rather extensive entomological collection, which has remained intact for many years; but these are in upright wall-cases, and exposed to the light. The light I am of opinion goes far as a check to the moth ravagers, who, as a rule, prefer the dark for the prosecution of their labours, as they are most commonly found under the feet of birds, under their wings, and other dark and obscure places.

I am quite of opinion that extreme dryness is the best antidote against decay in museum specimens, as I fancy neither moth larvæ, acari, vegetable mould, or other destructive agents can act successfully in the absence of all moisture; and were the temperature in our collections never to be allowed to fall below 70° Fahrenheit, no preparation of any kind, either for poisoning the specimen, or the atmosphere by which it is surrounded, would be necessary; dryness alone would present a sufficient barrier to decay. I merely adduce this as an opinion; how far it will meet the confirmation or dissent of your far more able correspondents, time may best show. In conclusion, one instance may add a little weight to what I have asserted. When a boy, forty-five years ago, I set up a barn owl, with the intestines and viscera extracted, without any prepara-

tion, except a little alum and pepper; it has stood on a shelf in the kitchen, without case or cover, where the temperature is pretty high, to this time entirely uninjured; while rarer birds, upon which I have employed every care in skinning, preserving, and casing, have long ago gone to utter decay,

Jos. R. Wallace.

Cumberland Museum, near Whitehaven.

DARKLING SPIDERS.

In Science-Gossip for January, Mr. J. R. S. Clifford asks some questions not very easy to answer, in regard to the food, &c., of spiders which inhabit dark unused cellars, from which perhaps light is shut out for months together. Mr. Clifford also asks why such spiders spin webs, seeing that few, if any, insects ever approach them; and suggests that these spiders come out on hunting expeditions to obtain food, and that the only use of the webs is as habitations.

I now beg to introduce to the readers of Science-Gossip another darkling spider, which lives under circumstances similar to Mr. Clifford's pets, with this difference, that whereas his live in the basement of a house, mine lives several hundred feet below the surface of the ground, in a darkness which has never been broken by the slightest ray of daylight, and so seldom by artificial light, that probably several generations of spiders may be born, live, and die without having seen light at all. To Mr. Clifford's remains the liberty of coming out when they choose; of mine may be said—

"Superasque evadere ad auras,
Hoc opus, hic labor est."

This dweller in Cimmerian darkness is the little *Neriene errans*, and its chosen habitation is some of the Durham coalpits, in one of which I had the pleasure of making its acquaintance some years ago.

Before, however, narrating my experience in regard to it, I will give one or two extracts from a paper by Mr. Meade, in the "Annals and Magazine of Natural History" for July, 1860. Extensive masses of web-like tissue had often been noticed in some of the northern collieries, but had always been considered to be the mycelium of some fungus, till my friend, Mr. D. P. Morison's duties, in connection with the Pelton colliery, brought these masses to his notice. Mr. Morison's entomological knowledge led him to suspect the true origin of the web-like layers; and, to satisfy himself, he sent specimens to Mr. Stainton, who forwarded them to Mr. Meade. A correspondence then ensued between Mr. Morison and Mr. Meade, the result of which was the above-mentioned paper in the "Annals," from which I extract the following:—

"The mine in which these spiders and their webs are found is called the Pelton Colliery. The seam of coal averages 4 feet 6 inches in thickness, and is 320 feet below the surface of the ground; about seventy-five horses and ponies are employed in the mine; and Mr. Morison suggests that the insects upon which the spiders live are conveyed down with the fodder for the horses. He also tells me that 'the spiders themselves are to be found in the *waste*, or parts of the pit not actually at work; and the webs are generally spun in galleries through which little or no air passes. The spiders seem to be quite gregarious, as whenever a rent has been made in any of these productions, they might be counted by scores together (so our wastemen tell me) repairing the damage. They seem to be, in spite of their dark existence, very susceptible to light, and the appearance of a lamp produces no small commotion among them.'

"It is an exceedingly interesting fact that a minute spider, ordinarily living in the open fields, should find its way to such a depth beneath the surface of the ground, and multiply to such an extent as to be able to construct, by the united labour of hundreds, immense sheets of web, stretching through all the deserted subterranean galleries. It seems that this little creature, at the same time that it shifted its abode, must also have acquired new instincts, becoming social and gregarious in its habits, and thus departing from the manners of most of the spider tribe, which are usually solitary, except when quite young. It may be said that numerous and large spiders' webs are often met with in other dark underground places besides coal-pits (as cellars, caves, &c.); but these are always constructed by larger species, each individual living separately, and having its own web; the spiders forming them may also mostly be referred to the genus *Tegenaria*, to which our common house-spider belongs."

Now for my introduction to the *Neriene* "at home."

When on a visit to Mr. Morison, in 1866, he suggested that we should go and see the spiders, a proposition to which I at once agreed. So arraying ourselves in the appropriate habiliments, we descended the pit, and having been provided with safety lamps, proceeded to the "waste." Persons who have been into such a place need not be told that the silence that reigns there is profound; but to those who, like myself, have never before been down a coal-pit, it is perfectly appalling, especially when the thought arises, that if the roof of the galleries (which was in some places so unpleasantly low as to entail a mode of locomotion more suited to quadrupeds than bipeds) were to "cave in," what an unpleasant predicament we should be in! Such silence I had never before experienced; but since then I have been in an equally silent, but far different place, the "Jardin" of Mont Blanc.

At last, after creeping through various holes, we came to the spiders, and forgot the silence and the low roof in the excitement of hunting them out. I did not notice any insects in the webs, but Mr. Morison has found the remains of some of the Tineina. I saw several individuals of apparently some species of *Poduridæ*, creeping about the walls, but did not succeed in securing any specimens. I, however, brought away a few of the *Neriene*, which I afterwards presented to the British Museum.

F. Buchanan White, M.D.

ENGLISH MOCKING-BIRDS.

A RAMBLE through the wood at this particular season of the year carries one back to the days of boyhood, when we listened with delight to the cuckoo; and very many of us can look back with joy to the days when we hunted the wood in quest of birdsnests, stick in hand, knocking at the trunk of every tree that happened to have hay or hair attached.

Whatever may be the difference of opinion, there is certainly a charm not to be forgotten—our boyish delight would not allow us time to consider whether it was cruel to rob the old birds of their young. Away we go merrily, tap, tap, echo, echo; what's that—a nest? yes 'tis one, a nest; up we go, must have it. Our expectation is raised to the highest, no danger will stop us; although a break-neck chance, up we go; after much climbing and slipping and "hairbreadth 'scapes" the nest is reached; but, alas, all in vain; it is an old one, so after a day's toil and pleasure we, having taken nothing, determine to have another day; but in the mean time we purchase a queer-looking bird, bill and legs long, no tail (but he soon will have one), pink capacious mouth, body black and white.

The recollection of this bird suggests a thought; how many mocking-birds does this country produce?

For not only have many of our birds the power of imitating each other, but are really good mocking-birds, of course inferior to the grey parrot of Africa; but equal, and more so, surpassing the crested and pert-looking cockatoo, which makes a great noise, and has but little to say; and for beauty of feather our mocking-birds are not surpassed; for cunningness they are often a match for man. Take for instance the beautiful magpie—the intelligent eye, superb plumage, shining with so many hues, and handsome symmetry; but perhaps the most enchanting of all is the perfect cunningness displayed in its every movement: even sitting still seems mischief, every step seems bent upon some rascality, and when actually enjoying himself, we get the most amusing mischief one could coin; monkey-like, but so much more refined.

Wood, in "My Feathered Friends," says, "There is a green pan placed by the side of the door, which he considers as his own property; after the milkman has furnished the quantity required by the house, he pours a few spoonfuls into the pan for Mag. Mag is grateful for the kindness, and usually escorts the man as far as the door. After the gate is shut, he thinks the obligations of hospitality satisfied, and peeps underneath to see if there is any chance of pecking anybody's ankles. For he has a great predilection for ankles. If a female visitor is hardy enough to take a seat in the kitchen, Mag is delighted: he hides himself under the chair and then, watching his opportunity, administers a severe peck to the ankles; the aggrieved party jumps up, but sees nothing, for Mag takes good care to keep himself out of view."

All this is but a tithe of his mischief, as those well know who have been so fortunate as to have kept a tame magpie *not* in captivity. Not only for his mischievousness is he worthy of notice, he is capable of great attachment, following you about like a dog, feeding from the hand. And in a garden he is most useful, destroying a host of insects and keeping the ground free from small birds; so as a watcher he might be prized by many, for he is always on the alert, seemingly proud of his charge, fearless of every thing, even making sport of the cats.

I have seen puss walking off as though she did not see Mag, who is strutting after her with his tail erect only looking out for the chance to catch hold of her tail—a feat which he mostly accomplished. Now puss would stop, Mag the same; puss makes a move, Mag follows; now a chance occurs, Mag gets hold of the cat's tail, and before puss gets round the rascal mounts the fence and sits there wagging his tail, eyeing puss coolly and cunningly, as though he had been there an hour; the cat is now allowed to slink off while Mag seeks some fresh sport.

There is a great flourish to his oddities: he is a fine mocking-bird, being capable of speaking many words, and very plainly too; equally as comprehensible as the African parrot, but of course not able to manage so many.

I might here mention that Mag is not difficult to teach, and very little trouble to rear; in fact he is hardy, only requiring a little raw meat and other soft food. As soon as Mag can feed himself, you may leave the door of his cage open; he will then get about, and soon be strong enough to defy all domestic pets.

A short time ago, while rambling through the woods, I found a beautiful mocking-bird, dead of course. How many of these birds are destroyed by men who rarely trouble themselves about natural history; scarcely caring to be able to distinguish one bird from another, having no why or wherefore,

merely that they have knocked down a bird, thrust it into the pocket and carried it home for the children or cat.

The bird I found was remarkably handsome; had it been a foreigner, no doubt it would have commanded a high price. Its beautiful crest of soft light brown feathers, striped with black, surmounting a beautifully-shaped head, handsomely ornamented by an intelligent light-coloured eye; the back and breast a beautiful soft brown; pinions of the wing the same, from which spring some pretty blue feathers, barred by three or more shades blending rom a very light to almost black; the quill of these feathers being a jet black, and as fine as a hair, giving the whole a remarkably handsome appearance. The largest of the wing-feathers are fringed with a bluish-white, the upper long ones are a velvety black, about the centre of which each has an elongated serrated white mark, fringed with pretty blue; the whole being crowned by a few beautiful black feathers, legs a delicate pinky hue, quite in keeping with the body of the bird so feebly here described, known as the common jay.

The Jay can be domesticated, and will be found a cheerful companion; he can be taught to talk well. He will require the same treatment as the magpie. Both birds must be kept clean, and will require a plentiful supply of water, as they are passionately fond of bathing. At this time of the year either of these beautiful mocking-birds can be purchased at less than two shillings each.

Our next is the Jackdaw, which is soon domesticated, but is scarcely worth the trouble; he has some cunningness, but barely enough to keep himself at liberty; it is not difficult to catch a tame jackdaw, but not so with the above-mentioned birds, that are rarely caught by any device. He will bear confinement well, but should have a large cage; he is capable of great attachment, and can be taught a few words. His tone of voice is not so good as the magpie or jay. He should have flesh and a bountiful supply of water.

The Starling is very worthy of notice as a mocking-bird; he has a beautiful plumage, purple and gold: his feathers are a rich purple, with a yellow spot on the tips; the purple showing beautiful shades, according to the exposure to light. He has a fine yellow bill, which, for the size of the bird, is rather long. He is extremely cunning, and when in the field seems to exert the whole of his ability for self-preservation; he is not easily shot, although within range of your gun, taking care to keep close to cattle, so that you could not well hit one without the other. His nest is frequently built in a tree near your door, the entrance of which will not admit the hand, and by his perfect composure seems to convince you of his well-chosen security.

The Starling will sometimes live to a great age. I recently heard of one, now in the possession of a commissioner from the Danish Government, that lost a leg in the Crimea at the time of the Russian war. Jacob was furnished with a quill fastened by a piece of India-rubber, a substitute which answered the purpose well.

The Starling is an excellent mocking-bird; he can be taught to say almost anything; besides which, he will whistle several tunes, at the same time becoming very tame.

All birds that are to be taught must be brought up from the nest, or your exertions will be in vain. Perhaps of the birds here mentioned, the Starling is the best to keep in a cage; he will eat almost anything, but cannot do well without a little raw meat.

C. J. W. Rudd.

THE CAPTIVE BULLFINCH.

If the majority of bird-lovers, male and female, old or young, were aware how attractive a bird our English Bullfinch is when caged, the demand for this species would ere long exceed the possible supply. Now, most years, a certain supply of these birds is in the market in December or January, the price then varying from two to three shillings; whereas a few months later you will be asked five or seven, on the plea that the individuals offered you have become tame, and are also in full song. The latter may be true, the former quality is not one birds readily acquire in bird shops, unless they may happen to have been considerably short of food. In fact, tameness in birds, as in most other animals, is a thing produced by the giving of particular attention to the object in which it is sought to be developed—it is a result of culture usually, and the ordinary vendor of birds has scarcely the time, or the inclination, to make attempts at taming many out of the hundreds which pass through his hands. Moreover, they have at the aforesaid establishments some mode of terrifying for the nonce, a fluttering bird into seeming quiescence. Therefore, gentle reader, when about to purchase a feathered biped do not be persuaded to pay an additional premium for a bird "warranted to be tame," because the chances are that you will be swindled thereby.

Returning to the point we started from, I repeat that an English bullfinch is a far better investment than some may suppose; and as you can buy a dozen for the same amount you would pay for a German bird, which dies perhaps in a few weeks, or at any rate, in a year or two, and perhaps treats you to a "mixtie maxtie" of airs (to use Burns's expressive words), instead of the distinctive songs you hoped to listen to. Not that our native bird is at all a bad vocalist. In ordinary descriptive books he is said to have only two or three notes. This is a mistake; all I have heard in cages giving utterance to a much greater variety. Besides the ordinary call-note, it will be noticed that when this

bird is in health it will be almost incessantly uttering a note in a still lower key, which is formed without opening the bill; but it is not very easy to ascertain from the song of the imprisoned bullfinch what notes he whistles in the woods and orchards, because when caged he introduces a variety of notes into his melody, should he have been kept within hearing distance of other singing-birds. These casual notes are interjected in a singular manner, but do not totally overpower what seems to be his own peculiar strain. One bird which I had an opportunity of observing, brought in occasionally a long shrill whistle; and there is no doubt that by frequently whistling before even an adult bird some simple tune, it might be made to pick up at least fragments of it. However tame a bullfinch may have become, it is usually reluctant to sing unless it is alone; though with some the song may be started if a person stands near them, and moves his head slowly to and fro, at the same time making a low monotonous whistle.

I am afraid that it must be confessed that the Bullfinch is not remarkable for his sociality—at least towards other birds. In aviaries, so far as I am aware, this bird is rarely introduced, nor would he be likely to conduct himself in a mixed society of finches with much regard to courtesy. One which I have seen in cage for some time, has always manifested much indignation if another bird was brought at all near to him; and he also showed a curious antipathy to, or jealousy of, children, arising possibly from the same cause as that feeling many dogs display, when children are noticed before them, and which is sometimes so strong that, if not kept back, they will actually fly at the person caressed. The Bullfinch, however, satisfied himself by opening his mouth angrily and uttering a hoarse croak.

If not cordially disposed towards his brethren, this bird soon becomes exceedingly familiar and affectionate, if kindly treated by those about him. He may be taught to take seeds from the finger or the mouth, and will distinguish his usual feeder from other individuals he may be accustomed to see. When thus tamed, on the approach to his cage of any one he recognizes, he will perform a friendly salute, by tapping gently with his bill upon the face or the hand, if presented to him. One thing is notable, that however wild a bullfinch may be, he despises all efforts to disturb him at night. When sleep overpowers him, he settles himself down with resolute stolidity; and one that has been during the day in a flutter if there was any one within a few feet of him, may be approached after roosting-time with a lighted candle, and though he may deign just to turn his head round, he will not move on his perch.

It has been observed, doubtless, by those who have kept different species of finches in cages or aviaries, that most individuals of such species as the goldfinch and linnet, though they may be tolerably tame, do not care to be set at liberty in a room. The canary will recreate himself greatly in this manner; for, through having been bred in confinement for many generations, he has become thoroughly domesticated; but not so other finches, which are either unwilling to leave their cages at all, or, if liberated, fly about wildly. The only exception is in the case of some nestlings, which frequently acquire, as it were, habits differing from those natural to the species. The Bullfinch, in particular, is very uncomfortable when taken from his domicile. The effect upon him of this unwonted liberty is a complete confusion of ideas; he dashes wildly at the window, or against some conspicuous object—or, as in a recent instance, when one was liberated in a room where there was a fire burning, he darted towards it under some erroneous impression as to its nature, we may suppose. The hapless bird alluded to actually planted himself upon the top of the coals, whence he was rescued with some damage to leg and wing; the result being that one leg afterwards dropped off. In spite of this, he still manages, by means of the remaining limb and the stump, to mount his perches, although his tumbles are frequent.

Hemp-seed, so it is said, decays the colour of bullfinches. Unfortunately there are some which positively reject other food; a mixture of hemp and rape seems, as far as health is concerned, to suit them tolerably well. If possible, it may be more advantageous to keep them on canary and rape, with a little poppy-seed added occasionally. Considerable satisfaction is afforded to a bullfinch I am accustomed to observe, by the donation of occasional flies, which he gobbles up readily. He is, nevertheless, highly discriminating, rejecting most decidedly any that are offered to him which do not belong to the species *domestica*. At times he will attempt to catch these as they fly about his cage in summer, though rarely successful, through his lack of agility. J. R. S. C.

THE FLEA.

(*Pulex irritans.*)

THE notice of Mr. Furlonge's paper on the anatomy of the flea in the May number of SCIENCE-GOSSIP (which gives me all my knowledge of it), has led me to look over some notes in my portfolio, and a drawing made on the screen of the solar microscope, more than two years ago, of the tongue and lancets of the Bed-flea. Very little seems to have been known of this familiar object before the appearance of M. W. Lens Aldous's beautiful and well-known drawing made under the solar microscope; for the par-

ticulars given in the Mierographic Dictionary are so very wide of the mark as to be likely only to puzzle and mislead. Mr. Aldous is therefore entitled to our thanks, while it must be contended that his drawing has been, as the florists say, too much "dressed;" that it is, in short, sensational; and the French, it is admitted, do love a sensation, and that sometimes of a less innocuous kind. The tongue is set on too high (after the fashion of an elephant's trunk), on a level with the insertion of the palpi, out of the line of the alimentary channel, and too far from the lace-like case provided for it; this, in the absence of its true tenant, left out in

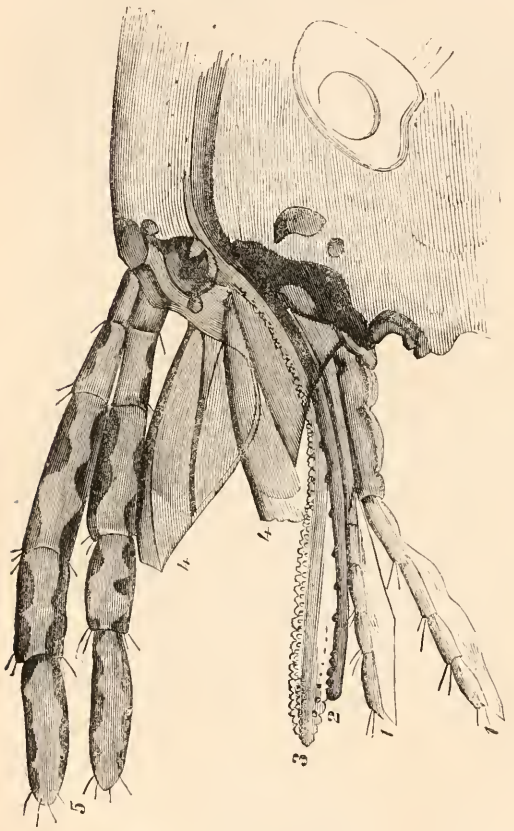


Fig. 75. Tongue and Lancets of Flea × 200. 1, 1. Lancets. 2. Tongue. 3. Tongue-case. 4, 4. Lancet Sheaths. 5. Palpi.

the cold, is appropriated to the lancets, and the proper coverings of these are treated as mere appendages to the head, without use assigned; for there is nothing left for them to cover. Professor Rymer Jones, in his "General Outline of the Animal Kingdom," p. 258, gives a reduced copy of this drawing, and thus explains it:—"In this insect the piercing organs are two sharp and razor-like instruments, placed on each side of the elongated tongue, and enclosed in a sheath (4, 4)," (this tongue-sheath) "probably formed by pieces representing the mandibles of mandibulate insects. Two palpi or feelers, and a pair of triangular plates, complete this remarkable apparatus."

It is these triangular plates I would beg to bring in question. It will be observed in the illustration to this paper, that the backs of the lancets are jointed so as to admit their taking the form of curves, the blades from their horny nature being no doubt flexible too, and indeed they are in some specimens seen to be so. They can also, it would seem, from the appearance of the arms on which they are fixed, be retracted, like the claws of a cat, and in this form and position would naturally rise into the sheaths placed just above them, and which appear well fitted for their reception. I have not hesitated accordingly to name the "triangular plates" lancet-sheaths. The tongue then will occupy the beautiful case provided for it, and which from its position can suit nothing else. It should be noted that only one side of this case is given in the illustration, the other half having been out of focus; and that the lancet-sheaths are distorted somewhat from their true position by the pressure of the covering glass: they should be exactly parallel.

I am curious to see whether Mr. Furlonge, in his paper read before the Queket Club, takes the same views. To prepare the head of the Flea for this investigation is not difficult: having first caught your flea, immerse it for two or three weeks in spirits of wine, and then, having covered it with a drop of thick gum on a slip of glass, to prevent flying under the knife, sever the head from the body and legs; press this severely between two slips of glass while on the stage of the microscope, and when the parts are seen to be fully developed dip in spirits of turpentine and mount at once in balsam under strong pressure; for the integument is thick and as hard almost as tortoiseshell. A more transparent preparation might be made by using a caustic solution, but this might be at the sacrifice of some delicate parts. S. S.

Canada Goose.—A very fine specimen of the Canada goose (*Anser Canadensis*) was shot to-day (the 3rd June), by George Lamb, a beckwatcher to the Driffield Anglers' Club, at Brigham, a few miles down this stream. The bird was a male, and weighed thirteen pounds.—*George R. Dawson, near Driffield, Yorkshire.*

New British Cluster-cup.—Mr. R. Southey Hill has discovered, near Basingstoke, on the leaves of *Statice*, a species of cluster-cups new to Britain, and rare on the continent. It is the *Æcidium statices*, Desm.

FOSSIL OOLITIC PLANTS.

A FEW years ago I purchased of a dealer in curiosities at Scarborough some sections of fossil plants, which he had prepared from the pebbles which he had found on the shore. Though it is impossible to say with certainty from what particular formation they were derived, it seems most probable that they came from the

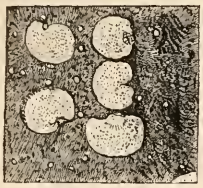


Fig. 76, × 4½.

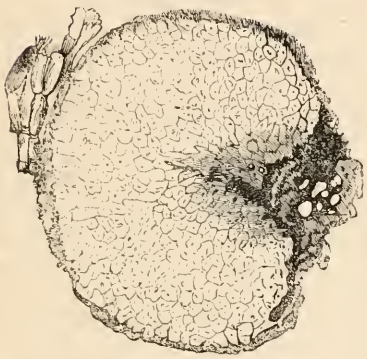


Fig. 77, × 30.

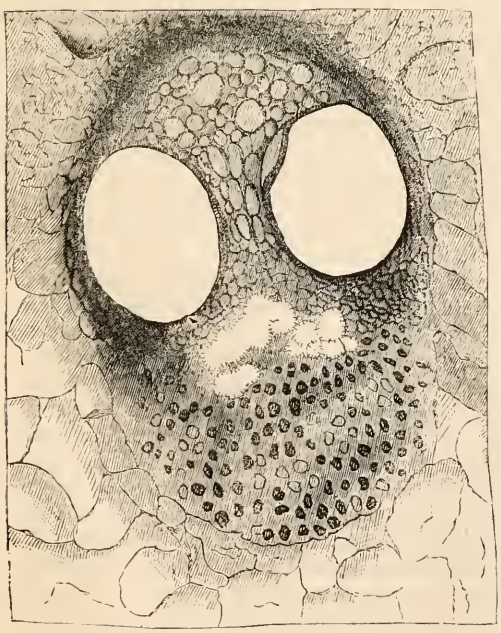


Fig. 78, × 100.







Fig. 83, × slightly.



Fig. 79, × 240.

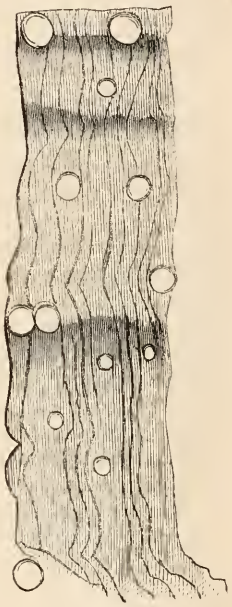


Fig. 84, × 30.



Fig. 80, nat. size.



Fig. 81, × 3.



Fig. 82, × 240.

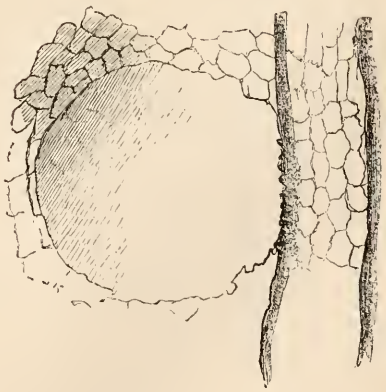


Fig. 85, × 240.

Upper Sandstone, which lies below the *Corn-brash*, and which occurs at Carnelian Bay and Gristhorpe

Bay. Two of them (76 to 79), Endogens, are probably palms; the third, an Exogen, seems to have been, perhaps, a climbing plant, as I judge from the peculiar twisting of the medullary rays.

The concentric bands in the cells of fig. 79, are interesting; but are probably due to the successive deposits of silica. It is very wonderful how some portions of vegetable structure are represented (I suppose one can hardly say preserved) in all three specimens. The fossilization of such plants must to some extent have been rapid, or the soft vegetable structures would have perished before they could be replaced by silica.

I hope some of your readers, who are familiar with the microscopical aspect of tropical vegetation, may be able to throw some light upon these interesting remains. J. S. Tute.

NOTES AT NANSLADRON, NEAR ST. AUSTLE, CORNWALL.

Golden Oriole.—In the early part of May, 1868, I noticed the voice of a bird in the woods surrounding Nansladron, quite new to me. Every friend whose attention was directed to the sounds declared that they were equally new to him. One person suggested it was a parrot or parroquet escaped from its cage; another, that it was a variation in the cry of the Green Woodpecker; and for many days, owing to the extreme shyness of the bird, it was impossible to say what denizen of the air produced such extraordinary music; but on the 17th I had the good fortune to come upon it suddenly in the orchard, and as it flew away from me at not a greater distance than twenty feet, and continued to utter its note "puhlo, puhlo" in its flight, the size of the bird, and the blaze of gold in the sunshine, immediately proclaimed our new friend to be no other that the Golden Oriole (*Oriolus galbula*).

On the day it was first recognized, it appeared to have made up its mind to tenant a little wood of about an acre behind our house, for it remained there till late in the afternoon, when, hearing a tremendous noise amongst a body of rooks in the constant habit of visiting this wood, I went up to see what was the matter, and found the poor oriole in the midst of hot persecution. He was being driven from pillar to post, and every "caw" of the rooks seemed to say as clearly as possible, "Out, out, turn him out, whoever heard of a yellow bird,—turn him out;" so that the poor oriole was compelled to fly for its life, and very possibly my coming to the rescue was the turning point of its existence.

I do not think it ever visited our wood again; it was seen a few times in the orchard, and we had the daily pleasure till the end of the month of listening to its loud, clear, ringing bell-like voice in the trees of the St. Austle valley. We noticed during the last few days of May, that the cry was shortened into "lo, lo," the "puh" being left out; and soon after the beginning of June, acquaintance with our new friend suddenly ceased. We will hope that its absence depended upon its own will; but various poppings heard in the valley made us shake our heads with sadness, when we thought of collectors and cockney sportsmen: "Belluæ sunt et feri Molossi, hominum facie et habitu."

Cuckoo.—On the 14th February, 1868, whilst out for a ramble, I heard the Cuckoo twice; my wife was with me at the time, and she heard it as distinctly as myself. Had I been alone, very probably I should have doubted my sense of hearing; but as we were both quite certain of the sounds, I do not see the possibility of a mistake. I cannot find in my books that any note has been made of such an early visit to this country, for it is at least six weeks sooner than the Cuckoo generally arrives. The poor fellow must have had a solitary time of it till April, and doubtless moaned often enough over his mistake of setting out so early from sunny Africa.

Carrion Crow.—In this neighbourhood the Carrion Crow (*Corvus corone*) is very common, and during the hatching season of chickens and ducklings, farmers are quite as much afraid of the depredations of this foul bird, as of falcons, hawks, or owls: the young of anything is not safe from his attacks, and sometimes he has the audacity of lugging away half-grown ducks and fowls. One morning I heard a very loud quacking amongst some ducks in the long grass hard by, and on stealing down behind the hedge to discover the cause, found an impudent Corvus endeavouring to kill a full-grown duck. There were three ducks in the field, and his *modus operandi* was simply to attack and find out the weakest of the three: he would begin with number one, jump on her back, seize the neck in his beak, and bite and twist with all his might, Madame Duck, as you might suppose, making a great noise under the operation; after perhaps a couple of minutes, finding his worst efforts productive of little result, he would pass on to number two duck with the like event; then on to number three, and begin again. At length the stubborn truth seemed forced upon him, and he was obliged to give up the idea of a duck breakfast; he then seemed to utter many maledictions upon the toughness of their necks, rose in the air, discovered me, and was very quickly out of sight.

Rooks.—One summer afternoon my attention was drawn to a vast assemblage of rooks on our lawn; by the terrible vociferations they were making, it was evident that something very unusual was being enacted, for, clamorous as these birds are by nature, the noise and excitement of this meeting it would be almost impossible to describe.

> "C'était véritablement la tour de Babylone,
> Car chacun y babillait, et tout du long de l'aune."

After watching them some time, it became clear that they were in the act of carrying out some pre-concerted punishment upon some luckless offender of their own flock, for on the ground was a black object in the form of a rook, which was evidently being pecked at, rolled over and over, and so passed on from rank to rank of the assembled multitude. That it was not a mere pastime was evident from the ruthless way in which feathers were pulled out, and continuous blows given. Having waited about ten minutes, we felt a curiosity to know the effect of such chattering ferocity upon the poor black object, and drew near to pick it up. Of course the rooks flew away with loud cawings as soon as we approached; but, to our great astonishment, the prostrate bird opened its eyes, spread its ragged wings, and made as best it could for the nearest tree. Whether, if we had not interfered, the punishment would have been carried out *usque ad mortem* I know not; but clearly it was another good case to prove that the lower animals are governed by the same principles of thought and action as we are, each grade varying only in its mental and moral qualities, in proportion to the development of the nervous system.

Hawks.—Pliny, in his chapter on Hawks, says: "Alii non nisi ex terrâ rapiunt avem; alii non nisi circa arbores volitantem; alii sedentem in sublimi; aliqui volantem in aperto." As a good example of the second method of seizing prey, I remember in April, 1869, whilst working near some tall trees, I became aware of an unusual fluttering and beating of wings overhead, and on looking up saw that a hawk, most probably a sparrow-hawk, had pounced upon a full-grown pigeon, as strong on the wing as itself. For about half a minute there was a tussle and struggle in mid-air, resulting in the hawk holding the back of the pigeon in his talons, and directing the combined flight towards a neighbouring wood about half a mile off; it was evident that the poor pigeon, although keeping time with its wings, was exerting all its powers to break away, for the rate of progress was very slow indeed. When they had arrived to the edge of the wood, I was greatly delighted to see that the pigeon fairly wrenched itself out of the grip of the hawk, and was very quickly dashing past me to join the other pigeons, to tell her tale of the kiss of the falcon's beak. I noticed that the hawk did not attempt to overtake the pigeon and make a second attack, but sailed off in another direction.

Bird Prognostication.—People living in the country are able very frequently to predict the weather of the morrow by noticing the living barometers around them. If gulls leave the sea-coast, and in flocks fly inland with frequent screamings; if rooks sail about in large numbers, and precipitate themselves perpendicularly downwards with noisy rattling of the wing and tail-feathers; if the green woodpecker make the woods resound again with his sonorous and hawk-like cry,—a storm of some kind is not very far off—from my own observations, I should say not more than thirty hours distant, often much nearer than this; but sometimes even forty-eight hours before the change has arrived. The Romans knew these signs as well as we do, and very possibly it is a part of rustic lore everywhere. "Præsagiunt et animalia. Graculi sero a pabulis recedentes hiemem; et albæ aves [gulls] in mediterranea festinantes cum congregabuntur; et cum terrestres volucres contra aquam clangores dabunt, perfundentes sese, sed maxime cornix."

Since living at Nansladron, I have noticed that the daws and rooks sometimes go home very late to their roosting-places, but I do not yet feel sure that it presages a storm; neither have I seen the rooks perform their wonderful evolutions over water, besprinkling themselves with the same; but I quite believe the observation would be correct in a lake district; for very often I have felt astonished that the birds have not dashed themselves in pieces against the ground (and they do touch sometimes), so sudden and rapid has been the descent.

Why should gulls and rooks, and probably other birds, possess this power of anticipating changes in the weather? Is it a mere electric impression of their nervous systems? Or can it possibly be a consequence of direct vision? I rather incline to the latter supposition; for let us suppose that the approaching storm is travelling at the rate of 15 or 20 miles an hour, if the birds admonish me 30 hours beforehand, it is clear that they became cognisant of it when still 450 or 600 miles away; is it too much to suppose such power of vision existing in the eyes of birds? I do not think any of my readers who have ascended a high mountain will find this suggestion hard to believe, if they will only recall to mind the immense distances they have themselves seen, and remember the high reconnoitring flights of these weather-wise prophets.

Joseph Drew.

MYCOLOGICAL ILLUSTRATIONS.*

THE first part of a volume of figures and descriptions of new and rare Hymenomycetous Fungi is now before us, and we do not hesitate to declare that, Mrs. Hussey's excellent figures notwithstanding, these are the best figures of fungi which have yet been published in this country. It is well known that Mr. Worthington Smith is not only an enthusiast in the collection and study of the larger British fungi, but a master in the art of

* "Mycological Illustrations; being figures and descriptions of new and rare Hymenomycetous Fungi," Edited by W. Wilson Saunders, F.R.S.; and Worthington G. Smith, F.L.S., assisted by A. W. Bennett, M.A., &c. Part I. London: Van Voorst.

delineation. His large collection of drawings of Agarics, and their allies, is one of which any one might well be proud, and in these twenty-four plates he has reproduced some of these drawings, illustrating thirty species.

What a splendid addition it would be to the third edition of "Sowerby's English Botany," just drawing to a close, if all the British fungi, or at least all that do not require the use of the microscope for their discrimination, could be added, in the style of this part. We venture to think that no one would regret paying double the present rate of publication for the parts constituting such a supplement. If twenty-four plates of flowering plants are cheap at five shillings, twelve plates of fungi would be equally appreciated at the same price, because there is nothing else to compete with them. We congratulate all parties concerned in the production of this part, which we welcome as a valuable contribution to British Cryptogamic Botany.

ZOOLOGY.

Blind-worm (*Anguis fragilis*).—Yesterday (May 6th), while butterfly-catching in a wood in the middle of the day, I was suddenly rather startled by hearing a scuffling noise among the dead leaves a few feet from the path. Peering through the hazel-bushes, I descried a snake, as I imagined, having a quiet dance to himself—twisting, whirling, and thrashing the ground in the wildest waltz or the maddest polka. Now I have a most un-naturalistic dislike to snakes and other reptiles, and have, moreover, a strong belief that adders are waiting on each side of the path when I take a walk, for the sole purpose of burying their poison-laden fangs in my hapless flesh; therefore it required some little energy and pluck to approach the scene of not the butterflies' ball, but the snakes' polka. However, I at length summoned up sufficient courage to make the attempt: so detaching the butterfly-net from my stout walking-stick, I approached the spot, holding the stick before me as a kind of going-before hint to his snake-ship that if he imagined I was afraid of him he had made a slight mistake. But all my bloodthirsty preparations might as well have been left behind, as on pushing through the underwood and keeping at a most respectful distance, I saw not a snake or a viper, but only a harmless blind-worm,' and not only one, but two, joined together in the most inexplicable manner. I saw, on looking more closely, a sight which upset a choice little belief of mine, and made me for the time a sceptic on some other points. Well, one of my beliefs previously to this woodland scene, was that the blind-worm, though often suffering in character from the malignant reports spread about concerning him, was in reality a very pattern of herpetological morality. How vain are even a naturalist's conclusions when unsupported by fact. Here was my even-tempered, never-getting-out-of-temper member of the family *Scincidæ* struggling desperately with a relation, and, alas for my beautiful little theory! had got the neck of the other in its mouth, who of course objected to be treated in this disrespectful way, and the consequence was—a struggle. The reptiles paid not the least attention to my presence, and continued struggling and shaking each other with great pertinacity. Knowing that the creatures were harmless in a poison-fang-inserting point of view, I approached nearer and endeavoured to separate them with my stick; but not till I had made more than a dozen attempts could I succeed, and then they showed no disposition to fly, stowing themselves under the dead leaves close by. A person who came up just as I had succeeded in separating them, upset another part of my theory by maintaining that they had not only the power, but also took delight in burying their fangs in the meddlesome legs of naturalists and other inquisitive beings, and that they were deadly poisonous into the bargain. Thinking that the sooner I was out of such bad company the better, I marched off and employed myself in the peaceful occupation of netting azure-blue butterflies, and returning with unmitigated scorn and contempt the ferocious glances of a gamekeeper dodging behind a tree and eyeing my proceedings with a "take notice" magisterial air. Again, alas for theories! When I came to hunt up for facts, theories vanished away, for not even the ghost of a gamekeeper could be seen. I may here remark confidentially to the readers of Science-Gossip, that my friend's theory as to the "deadly poisonous" nature of the blind-worm, merely existed in his imagination, and was entirely unsupported by fact. That it bites when provoked I had ocular demonstration, but that its bites are poisonous is merely a theory. There are many people knocking about on British soil who imagine that everything—that is, every living thing—that bears a resemblance to a snake must as a matter of course be poisonous; but such an absurd notion may be quickly dismissed as worse than foolish. Not only snakes and blind-worms are thus condemned, but the frogs, toads, lizards, and newts are in most country places set down as poisonous in the highest degree. I have often been gravely assured that the toad spits fire, and all my beautiful theories have been poohpoohed most unmercifully, when I have attempted in very able logic to show that such a thing could not be, for very many excellent reasons, which it would be needless to particularize here. I wonder (if toads are thus gifted) that they were not used as fire-kindlers before the days of flint and steel or brimstone matches. Why, if toads had been domesticated on our mantelpieces, we should probably never have heard of Bryant & May's safety match, or even

Mr. Lowe's *unsafe* match-tax.—*William Henry Warner, Kingston, Abingdon.*

Orange-tip Butterfly (*Anthocharis cardamines*).—It will no doubt interest some of your readers to know that I took on May 6th, a beautifully fresh male specimen of this lovely butterfly, which measured barely an inch and a quarter across the wings, being little larger than a small Heath, though perfect in every other respect. I see by my diary that it appeared in this neighbourhood this year so early as April 14th, having myself seen two males gambolling together on that day. The Azure-blue Butterfly (*Lycæna argiolus*) is very common here this spring. I noticed in a wood on May 6th, dozens of Green Adela Moths (*Adela viridella*) fluttering about the bushes and hovering in the air, their polished metallic wings and long threadlike antennæ glittering beautifully in the sun. A dozen of Oak Eggar (*Lasiocampa quercus*) caterpillars in my breeding-cage have attained their full size, and are about to change into the chrysalis state, which I consider worth noting as it appears to me to be remarkably early.—*William Henry Warner, Kingston, Abingdon.*

Rooks (p. 137).—Perhaps it would further interest some of your readers (of the North at least), to be reminded that according to "Sykes's Local Records," a pair of crows built their nest upon the *top of the tube of the vane* on the Exchange at Newcastle-on-Tyne, in March, 1783, and again in 1785-6-7-8, each year succeeding in hatching and rearing their young; and, what is perhaps more singular, the nest was wisely built on the "windward" side of the vane, and moved round with it as the wind changed. The same local authority also informs us (vol. ii. p. 102, edition 1866) that for many years previously to 1815, a large ash-tree in the garden of the Vicarage (then in the middle of the town, I suppose) was much frequented by rooks.—*W. A. C.*

Extraordinay Positions for Birds' Nests.—A white-throated wren recently built its nest in the letter-box of the Duke of Rutland's gamekeeper at the Links, near Newmarket, and produced six young ones. During its incubation the old bird took no notice of the intrusion of the persons who went for the letters night and morning. A short distance from this remarkable nest is one built by a lark under the metals on the line of railway between Newmarket and Dullingham. The bird is sitting upon four eggs, and takes no notice of the thirty trains which pass over the line daily.—*Bury and Norwich Post and Suffolk Herald, May 16th*, 1871.

Otter-hunting.—The Hon. Geoffery Hill has again been hunting in Cheshire with his otter hounds. On the 18th of April, at Capesthorne, an otter was found, but lost again; on the 19th, two young otters were killed, near Over-Peover Mill; on the 21st, the hounds had an excellent run in the neighbourhood of Ashley and Nobberley; on the 22nd, an otter was killed at Reed's Mere; and on the 24th, another was found at Over-Peover Mill, and, after a hard day, was killed near Arley Mill.—*G. H. H.*

"Bat in Sunshine."—Coming down the river Test on a bright sunshiny day, I saw a bat flying about hawking flies over the river about midday; some swallows were doing the same thing near him. —*H. L.*

Rat Sagacity.—As instances of the caution of rats when they find themselves watched, take the following:—One of my men on night duty having placed a basket of grapes in a warehouse which he visited about midnight, was surprised to find the basket full of rats, neither grapes nor bottom of basket to be seen for rats. Having nothing to knock them over with, and being rather startled, all the vermin escaped. He retired immediately without touching the basket, which now contained little more than husks, thinking the rats would soon return to the charge; but they proved themselves quite as sharp as he was, for they returned no more to the basket, which he peeped at cautiously several times. When the men were at meals in the warehouse, the rats would pick up crumbs and fish bones almost from between their feet. Wishing for a shot at some of them, I dropped a few grains of maize on the ground, and took up my position, gun in hand. Soon one rat bounded across the space, as if in great alarm, but no rat touched a grain of the corn, which was exposed for several days and nights, being at last crushed and lost by the passing of feet and goods. Rats were numerous in the pigsties, and ate with the pigs; one of which I turned out of her sty, and contrived a trap-door to close the trough by pulling a cord. I baited the trough with ground maize, of which they are very fond; but neither by day nor by night would a rat venture there so long as the pig was excluded. Returning the pig to the sty, the rats also returned. The pig, after feeding, went to sleep, leaving the scrapings for her friends, which now made very free with the trough; and a girl being set to watch, destroyed upwards of twenty rats in two days. I placed a little corn in front of a hole, thinking they would come out, and I might shoot some of them. Heads were popped out, but only one very young rat came to eat. As I could not spare much time, I fired at the heads to be seen at the mouth of the hole, and, including the small one, found I had killed five rats. —*G. S.*

Climbing Rats.—Many of the garden paths in and near Oporto are spanned by timber-work for training vines, affording an agreeable shade. My white grapes, which were more forward than the

red, disappeared very fast. Going out at night, I found many rats were busy with my property; and, on being disturbed, most of them descended by one particular vine-stem, and dived into a hole, which was near. On the following night, I armed myself with a dark lantern and walking-stick, and stood by the above-named stem, the lantern throwing a strong light upon it, I being in the shade. An assistant drove them for me, when they tried the favourite means of descent. I killed five with my stick; others managing, after being struck, to reach the hole, probably to die. Several men being employed in gathering grapes, one of them found a deserted blackbird's nest full of small rats, which had probably taken up a temporary abode there, to be near their feeding-ground. The rats scampered off, springing from vines to trees, and from branch to branch, with such celerity, that the men described it as flying; and though, at least, four men joined in the chase, not one rat was killed out of six or seven. Hearing a sparrow scream one night, I saw, by the help of my lantern, that a rat had seized a cock-sparrow in a tree, and was holding him in his mouth. He jumped from branch to branch, attempting to gain the trunk of the tree, to make off; but being unable to effect this, as I was too near, and being alarmed for his own safety, he let the bird go, which, probably injured by the rat's teeth, fluttered to a very short distance to where a cat sat and watched proceedings, having no doubt been attracted, like myself, by his screams. Tabby immediately picked up her bird, and disappeared down the garden.—*G. S.*

"Cyrena fluminalis."—As this is the most plentiful fossil shell in the deposits at Erith, containing land and freshwater shells, mostly of species now inhabiting the neighbourhood, it seems curious, out of all the numbers met with in several visits to the brick-pits, that I never found a specimen having both valves united. Examples of *Cyclas*, *Piscilium*, *Unio*, and *Anodon*, with the valves joined, are pretty frequent in the sand strata. I should like to have a recent specimen of *Cyrena* to examine and compare with the fossils. I have plenty of the latter to spare, and would send some for a recent shell of the species, or to any one who wished for them.—*Harry Leslie*, 6, *Lower Moira Place*, *Southampton*.

Gnats.—"S. S.," in his communication on page 109, on "Gnats" (*Culex pipiens*), throws doubt on Réaumer's statement that the lower lip or sheath is bent like a bow, when the proboscis pierces the skin. Having had eight years' acquaintance with mosquitoes in their Paradise in the Hudson's Bay territory, and having often watched the process on my own hand, let me describe it. Their attention need not be courted. On the "Barren Grounds" of the Arctic Sea, they sweep down upon the frantic traveller in clouds like smoke. No particular spot is chosen: he is covered and pierced at all points. *Blacks* are, I think, the most poisonous. There are "*large browns*," "*small browns*," "*greys*," "*grey and brown striped*," and others, as we say, too numerous to mention. But under more favourable circumstances than this, let us sit quietly and hold the back of the left hand up to the level of the face, keeping the right for its accustomed duty of sweeping the face and neck, and wrapping any other part of the body. A "lady" soon alights and commences immediately to probe the ground. A tender part being found, the proboscis is rested upon it, while the legs are planted firmly and wide apart. Then the insertion is made by an oscillating motion of the head, gradually at first; but when half the length of the proboscis has entered, the rest soon disappears, and when on a fleshy part *right up to the base*. This is only for a moment; it is immediately withdrawn about the third of its length, and the creature is then seen to be filling with blood. During this time the sheath is bent *back* under the head and breast like an elbow, so that at the momentary insertion of the whole length of the proboscis, the two ends do almost meet. The insect may at this time be quietly picked off the hand by the wings, as it cannot extricate itself in a moment. This is the cause, I think, of the extreme irritation of the puncture on new-comers into the country. They rub and slap the insect off hastily, causing it to leave the proboscis in the wound. Far more formidable except in point of numbers are the Tabanidæ: their bite is like the plunge of a lancet, producing immediately a drop of blood, and the appearance as if a piece of flesh had been taken out. I have not seen Réaumer's description of the above process, so as independent testimony it may be interesting to your correspondent.—*T. T. S.*, *Thruxton*, *Hereford*.

Tomtit's Nest.—One afternoon last April, whilst sitting in the window of a room in the hotel near the Sunningdale railway station, which overlooked the garden, my attention was directed to a vase, about 3 ft. high, with a long narrow neck, at the side of one of the paths, in which a pair of tomtits were building their nest. I was told that the birds had built and reared their family in it two years following. Last year the position of the vase was altered, but evidently the change is not disapproved of by the birds. Near the bottom of the vase, in the side, is a small hole just large enough for the birds to enter and leave by, when the top of it is covered over, as it is sometimes during rainy weather by the daughters of the landlord, with whom the birds are great favourites.—*H. Budge.*

Cats.—A correspondent of the *Echo* estimates the number of cats in the British isles at four millions.

BOTANY.

Primrose Oxlip (p. 115).—The example described by "J. B." is, I think, a developed primrose, and not a hybrid at all; that is, an oxlip produced by development and not by hybridization. It would be very interesting to find that the primrose and oxlip fertilized each other, as well as the primrose and cowslip, as "J. B." suggests; and I must confess I see no reason why they should not do so. Still such examples as the one described are, as far as I know, so much more frequent in cultivated primroses than in wild ones, that it looks as if the richer nature of the soil alone was sufficient to cause an exuberance of growth in the inflorescence. These developed oxlips, as I take them to be, have nothing in common with the cowslip except the umbellate inflorescence; whereas all *hybrid* oxlips partake in some degree of the characters of each parent, and generally smell like cowslips. Two years ago I asked, through the medium of Science-Gossip, some of my friends to supply me with roots of the true *Primula elatior* (Jacq.). I had several handsome consignments sent me. They grow admirably in garden, flowering freely, and are very ornamental, and quite distinct from any other oxlip either hybrid or developed. The shape of the seed-vessel seems to me the best distinctive character; but the odour is also very peculiar, and rather disagreeable, resembling that of the Starch Hyacinth.—*Robert Holland.*

Local Floras.—It occurs to me that if some of your correspondents would furnish the titles of the various local Floras of Great Britain, it would be most acceptable information to your botanical readers. Few who cultivate that delightful science fail to travel more or less during the summer; and often one might have the pleasure of gathering a few rare plants, if furnished with a local Flora of the place about to be visited. I am sorry not to be able to set a better example, as the following list contains all I have seen. Brewer's Flora of Surrey, 1863; Dyer and Trimen's Flora of Middlesex; Edwin Lees's Botany of the Malvern Hills, 1852; Relhan's Flora of Cambridgeshire; Cooper's Flora Metropolitana; Watson's Botanical Guide; and there are occasionally lists of plants in various topographical works, as in Whitaker's "History of Richmond," &c. "Watson" is little more than an outline, and "Cooper" is nearly useless in the vicinity of London; *e. g.*, who would now expect to find the *Leucojum æstivum* in the Isle of Dogs? No doubt, many more works of the kind are in the British Museum, but unless furnished with the author's name it is difficult to find any book there. A compilation, containing a classification of works according to subjects, is much needed in the British Museum, as "Watts" is now quite out of date. It is to be hoped that all who call themselves botanists, when finding a rarity, will remember that useful adage, "Of a little take a little," and not thoughtlessly gather ten times more of the plant than is wanted: such rather deserve the name of "Plant-haters" than "Plant-lovers."—*H. E. Wilkinson, Penge, S.E., May* 19, 1871.

Heartsease (*Viola tricolor*) is best known in Danish by the name of *stifmoder blomst*, or step-mother's flower; the two large plain-coloured petals being supposed to be the step-daughters, and the others, which are more gay-looking, are her own daughters. A lady friend of mine who has been some time in Denmark furnished me with the above note respecting the Heartsease.—*H. G. W., Beaumaris.*

Simethis bicolor, Kunth.—Has this rare denizen of our island been found very recently on the "sandy heath, now planted with firs, two miles from Bournemouth, Dorset"? At the very end of May last, visiting what I concluded to be the right spot, no trace of *Simethis* was visible. If not extinct, can any one who has found the plant of late give such directions as will insure my success another year? It is much to be regretted that the authors of new Floras copy localities blindly, in the way they do, either from some older manual, or from the fountain-head of such information, and the source whence botanical borrowers too often draw error,—the out-of-date localities in that otherwise excellent work "Cybele Britannica." These have been, and are, copied year after year, *ad nauseam*, without the least pretence at verification. "Take on trust from another what a little patience and trouble would ascertain for certain," has come to be a standing rule, as though the great work begun by H. C. Watson and other honoured veterans, was to suffice for the present century, and find no one capable of adding to and carrying it on. It is comparatively difficult to prove a negative, and yet pretty certain that in one-half at least of the exact localities given for rare plants in "Cybele," it would, to-day, be perfectly useless to search. The production of a "Local Flora," too, is, nowadays, a work of compilation only: it is not considered at all necessary for the author to be a practical working botanist, nor for him to contribute one single "station" to the work himself. And only during the last day or two I have come across an instance in which the author of a local Flora, for a large and important district, was unable to recognize at sight, in the fresh state, the order of a well-marked ranunculaceous plant common enough in his own neighbourhood!—*F. A. L.*

Tordylium maximum, Linn.—Can any one inform me if it be possible to obtain a few *seeds* of this plant; if so, from whom?—*F. A. L.*

MICROSCOPY.

Melicerta ringens.—In an article on "Rotifers" (S.-G., p. 110), your contributor "E. S.," speaking of the *Melicerta ringens*, says: "It is not easy to trace the process of receiving, smashing up, manufacturing, and placing the pellets, from beginning to end. So far as I could form an opinion, it seemed to me that the particles received through the mouth passed at once to the gizzard to be smashed up, and were thence conveyed to an organ called, I believe, by Mr. Gosse, from its function, the 'mill,' and from its shape, the 'ventilator,' to be formed, by rapid rotation and mixing with some viscid fluid, into balls." This view of the subject appears to me entirely to differ from that of Mr. Gosse and other observers of this interesting rotifer. Mr. Gosse states clearly that the particles which pass to the gizzard, and thence into the stomach, are quite distinct from those which are carried by ciliary currents into the "mill," or brickmaking organ. He says that the latter particles "swiftly glide along the facial surface, following the irregularities of outline with beautiful precision, dash round the projecting chin like a fleet of boats doubling a bold headland, and lodge themselves, one after another, in the little cup-like receptacle beneath. The action of the cilia which perform this transport is clearly seen, and I believe that they are continuous from the great sinus to the cup." Further on he says, "Some atoms of floating carmine now and then passed down the œsophagus into the gizzard, and thence into the stomach; but these were quite independent of, and unconnected with, the pellets, which were composed exclusively out of the torrent that had passed by the disk."—*Trans. Mic. Soc.*, 1851, vol. iii. part ii. page 62. My own observations quite agree with Mr. Gosse's views; by mixing carmine with the water, and viewing the object, say with a power of 120, and dark ground illumination, the course of the particles can be plainly seen. I may mention that I obtained *Melicertæ* in considerable quantity on the occasion of the South London excursion to Barnes Common, on April 15th. They were attached in large numbers to the submerged leaves of the water ranunculus. By placing them in a small aquarium, I have succeeded in keeping them alive up to this date (May 15th), and also in obtaining a number of young *Melicertæ*, hatched since the weed was placed in the aquarium. One great disadvantage of "E. S.'s" plan of observing these rotifers (by placing them on a glass slide, covered with a thin circle) appears to me to be that it is difficult to keep the *Melicertæ* alive for any length of time. It is often interesting to keep one individual under observation for some days, and frequent change of water is then absolutely essential. I have found it an excellent plan to place the *Melicertæ* in a small zoophyte trough, about $\frac{1}{10}$ inch thick. The rotifer can then be readily examined with powers up to 250 ($\frac{1}{2}$ inch C), and when done with, the slide can be suspended by a piece of wire in the aquarium from which the *Melicertæ* was taken, and there left until again required for observation. This plan I have found to answer capitally, the *Melicertæ* when taken out almost invariably having their lobes extended, and the cilia in full play.—*T. G. A.*

Scales of the Grayling (*Thymallus vulgaris*).—The scale figured below is that of another of the British fishes, in continuation of our series. By comparison with the figures already given, it

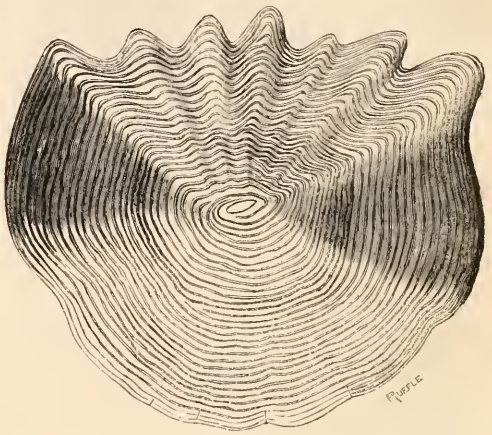


Fig. 86. Scale of Grayling.

will be seen that variety is not exhausted, and we have here a very characteristic scale, sufficiently different from all the rest to secure for it a place in every good cabinet of objects.

Pollen for the Microscope.—Referring to the recommendation for mounting (Science-Gossip, June, 1871) of the pollen of composite and malvaceous plants, I can say that the muricated pollen-grains and the scares for the pollen-tubes in these plants are often very beautiful. But to get a knowledge of the value of the character afforded by the pollen in the diagnoses of plants, our observations should be greatly extended; and they are well calculated to afford many an agreeable and instructive hour with the microscope, particularly to ladies. Even nearly allied plants may, in several genera, be known by their pollen-grains. Thus, in the "Popular Science Review," July, 1868, and in Seemann's "Journal of Botany," Sept. 1866, Professor Gulliver has shown, among other examples, that the *Ranunculus arvensis* is readily distinguished by its large and rough pollen-grains from *Ranunculus hirsutus*. Such observations should be multiplied, and would afford an elegant microscopic pursuit for ladies, who might thus increase our knowledge of good though minute characters for systematic botany.—*G. G.*

NOTES AND QUERIES.

The Small Eggar (*Eriogaster lanestris*).—Several solutions to the question put by Mr. Binnie in the April number of Science-Gossip (viz., "Are not instances of such great retardation unusual?") [*i. e.* of the emergence of imagos of the above moth] appear in your last issue. I may, from my own experience, reiterate the words of Mr. Livett, on p. 116, viz., "Certainly not, in this peculiar species." I have had numbers of the larvæ of this moth, and have frequently had to keep the pupæ a second, and even a third, winter before obtaining the perfect insect. Two other entomologists, whom I could name, inform me that they have met with the same disappointment; one of them—an old and experienced entomologist—tells me that he has always found that when the larvæ are taken when very young, they do not attain the imago state so soon. It is, I think, a well-known fact, that larvæ (of any kind) never thrive so well in confinement as when under natural circumstances; but this delay in the development seems more frequent in this particular species than in any other. Why, remains still to be solved. Mr. Livett's theory seems very feasible, viz.,—"That as the caterpillars are produced very early in the spring, a late and inclement season may destroy their food-plant and themselves, in which case the reserve of pupæ would prevent the total destruction of the species." I must again quote the words of my friend. He also says that he has often found that the larvæ of the Mullein moth (*C. verbasci*), when taken young and placed in confinement, do not attain the perfect state the following year, and he has often (as in the case of *E. lanestris*) had to keep them through a second winter before obtaining imagos; he consequently abstains from taking the larvæ (of both these species) until almost full-fed, in which case he obtains from pupæ imagos the following spring. I should like also to state that I have always experienced a great "mortality" in the larvæ of *E. lanestris;* I have always found that they die off in great numbers when almost full-fed, although provided with plenty of food and abundance of room. In 1867 I had 400 larvæ, but only a few reached the chrysalis state; I also had, in 1868, several hundred, only about half a dozen of which changed to pupæ, and one of them emerged in February, 1869, but none have emerged since. In 1869 and 1870 I was equally unfortunate. I have never found that the pupæ from the double cocoons, mentioned by Mr. Livett, came to perfection. I have frequently found them in my breeding-cage, and a friend informs me that he once had a large cocoon, containing three pupæ, none of which reached the perfect state. I should be glad to hear the experience of other entomologists in the pages of this work.—*R. Laddiman, Norwich.*

Pansey (p. 43).—I have the following analysis of fol. xli. of Bullein's "Bulwarke of Defence against all Sicknes, Sores, and Woundes," &c. (1562). "What is the goodnesse of paunsis, or three faces in on hodde? Some call it hartesease;" then a monkish legend as to its being called herba Trinitatis. At the end of the article it is written "paunses." I may here mention that on fol. vii. he says, "sorrell" is called in the north "sour dockens;" on fol. xlv. he calls *geranium* "shepherdes nedell," and of herb Robert he says, "but rather I take it to be called Rubertam a rubro colore, to an herb of a red colour." On fol. xxxix. an amusing passage (if my memory serves me) on *Beeis.—R. T., M.A.*

Cleaning Skeletons.—I have been told that the best way to get a small skeleton well cleaned is to bury the animal, after taking off the skin, in an ant-hill. I have tried this in a large hill of very powerful ants, and find the thin bones eaten away so as to spoil the skeleton. Then I put a mole's head into a nest of small reddish ants, and they pay no attention to it. Can any one tell me whether one kind of ant is better than another for this purpose, and also what time of year is the best?—*L. Gillson.*

Water-Snake (p. 142).—Surely the animal intended must be a species of *Gordius*, otherwise called a Hair-worm, some account of which will be found in Science-Gossip, 1865, p. 107. The usual length of the only species I know (*Aquaticus*) is much less than that given; still I should imagine it may vary, or these other species may exceed this in size. The superstition regarding the transformation of hairs into worms is very old, and has credence yet in English counties as well as in Welsh; and is easily explained through the similarity of the objects of it. A curious reference to an individual of this kind occurs in a letter of the poet Cowper's, written to his friend Hurdis, where he says:—"After a very rainy day, I saw on one of the flower borders what seemed to be a long hair, but it had a waving, twining motion. Considering more nearly, I found it alive, and endued with spontaneity, but could not discover at the ends of it either head or tail, or any distinction of parts. I carried it into the house, when the air of a warm room dried and killed it presently."—*J. R. S. Clifford.*

Shower of Insects.—A paragraph went the "round of the papers" a few weeks back, to the effect that a storm of insects fell in the Midland Railway-station at Bath, and that a large number remained on the platform, and were examined by scientific men during the day. The insects are described as descending in the form of a glutinous drop, about the size of a large pea, and many of them soon developed into a worm-like chrysalis, about an inch long. The *Dorset County Chronicle* contained this information on April 27, and the following week its readers were apprised of a most violent storm on the previous Saturday. "The storm was accompanied by a similar phenomenon to that of the previous Sunday; myriads of small *annelidæ*, enclosed in patches of gelatinous substance, falling with the rain and covering the ground. These have been microscopically examined, and show, under a powerful lens, animals with barrel-formed bodies, the motion of the viscera in which is perfectly visible, with locust-shaped heads bearing long antennæ, and with pectoral and caudal fin-like feet. They are each an inch and a half long. Scientific men pronounce them to be marine insects, probably caught up into the clouds by a waterspout in the Bristol Channel." A correspondent of the *Shepton Mallet Journal* (May 5) writes: "Having had my attention called to the specimens of insects that fell on Saturday, I have carefully examined them, and find that they are the larvæ of the gnat, which, by the high wind prevailing on Saturday, must have been lifted from the surface of the adjoining river and deposited on the platform." Can any reader inform me which account is correct, as each appears to me to contradict the other?—*W. Macmillan, Castle Cary, Somerset.*

The Ascent of Man.—Once upon a time, that is somewhere about the year 1400, there lived in Gilaw, near the Caspian Sea, a Muhammadan saint, called Mahmúd, whose ideas respecting the Creation appear to have been entirely *Darwinian*. Perhaps the doctrine of the transmigration of souls is a correct one, and our present Darwin may have been the Mahmúd of the past—the curious old prior who lived in the days of Timur, and who was persecuted by the Persian government as an arch-heretic. I have been reading a short article, taken from an Eastern publication, respecting this Caspian saint, and it may, perhaps, interest your readers to know that his idea of the Creation was as follows:—"*Nuktah ikhak*" (an atom of earth) underwent numberless changes: first of all it spread abroad in the form of plants; these plants became animals; and they in time developed into a distinct species—a sort of advance upon the brute kind, something very much like a gorilla, but far inferior to man as he was in Mahmúd's time; for he modestly states that gorilla-man, after throwing off various imperfections during successive generations, reached its perfection—"the human form divine"—in his own person. A few of Mahmúd's followers came to India in the 16th century, so his opinions must have gained ground in some minds.—*H. Watney.*

The Lotus.—A correspondent recently inquired if there is evidence of the use of the Lotus in India at all analogous to its use or adoption in Egypt; this was stated to be the case in India and also in Assyria (*see* Science-Gossip, No. 66, p. 124; No. 73, p. 19). My object in writing now, is to add that the Lotus is figured on the plaster cast of the Sanchi Topc gateway, on view at the International Exhibition; the date assigned to it is about coeval with the commencement of the Christian era. It may be noted that many characteristics of the ornamentation of this Buddhistic structure are very decidedly Assyrian.—*A. H.*

Tritons.—In reply to "E. Halse," in Science-Gossip for the last month (May), I beg to refer him to a paper contained in the "Annals and Magazine of Natural History" for December, 1853, by John Higginbottom, F.R.S., of Nottingham, which will give him every information he may require respecting the British Tritons.—*S. H.*

Fish in the Jordan.—"H. C. S. S." would be glad if any one would kindly give some information as to the kind of fish found in the river Jordan. He cannot find the names mentioned anywhere, but many works say that the river abounds in fish.—*June 5th*, 1871.

Earth-worm.—Mr. Soombridge gives the following prescription for the destruction of earth-worms. "Mix a small quantity of corrosive sublimate (about half a gill to an ordinary-sized watering-pot will be sufficient), and well saturate the lawn or path." I beg to state that corrosive sublimate is a *solid* crystallized body, but *not* a liquid. Mr. E. Winder suggests another formula containing the above salt, viz., "1 oz. of corrosive sublimate dissolved in 2 oz. of hydrochloric acid, one or two tablespoonfuls to be added to the canful of water." I would, however, recommend that in place of hydrochloric acid, a solution of sal ammoniac be employed to dissolve the very sparingly soluble sublimate. 1 oz. of each of the above salts will make about 12 gallons of a saturating solution when dissolved in water, which is perfectly innoxious to plants.—*R. C. Smith, M.D.*

The Pursuit of Science under Difficulties.—I had for some time looked with longing eyes on the undisturbed serenity of a small pond visible from the elevated platform of a certain railway station in the outskirts of the metropolis; for "having ranged and searched a thousand nooks" along the banks of "silver-breasted Thames," this particular pond offered itself in my estimation a *bonne bouche* not to be disregarded, and, "accoutred as I was" with collecting-case and stick, and fortified with a polite note explaining the object of my desire, I duly presented myself at the door of the mansion of the lady occupier and proprietress of the domain, who at once, to my surprise and amusement, stated her determination not to accede to my request in the following courteous terms:—"No; not if I know it. I s'pose it is you and the *likes* of you *as breaks* my fences! I should like to catch you at it. There's plenty of ponds and puddles about Wandsworth Common and Tooting Common; why don't you go there? No! young man, I shall set my gardener to keep a watch; go about your business." I went about my business, and was immeasurably amused to watch from the same platform for several succeeding mornings, the precautionary measures undertaken at the direction of this intellectual and amiable lady for the protection of her property, which consisted in depositing some *loads of lime-dust* around the banks of the pond in question, and in erecting an expensive wood fencing between her own and the grounds adjoining.—*Charles Cubitt.*

Sirex juvencus.—In Science-Gossip for Nov., 1870, I inserted a question on the occurrence of *Sirex juvencus* in England, commonly or otherwise; no answer to which having been received, I again ask, will any entomologist acquainted with the Hymenoptera kindly give me the desired information?—*W. Chaney.*

Violets.—I planted some pure white violets last year, but am astonished to see them come up this spring in blue (deep). I am at a loss to see why this is, as no other plants were near, nor even in the neighbourhood.—*H. W. H.*

Borax and Cockroaches.—In Hardwicke's Science-Gossip for this month (May), at page 117, it is stated that borax is certain death to cockroaches. The paragraph is taken from the "Journal of Applied Science," the back numbers of which I have not got, to refer to. I have thrown powdered borax over cockroaches without its producing the smallest effect on them, or even making them move. The *Growler* is over-run with cockroaches, and I should be much obliged to any one who would tell me how to get rid of them. The only thing I have found efficacious has been carbolic acid diluted, and squirted into the holes and corners they frequent; but this has the disadvantage of spoiling paint and furniture. What is really wanted is some poisonous and seductive food. All I have tried has utterly failed.—*Edmund H. Verney.*

Queries, G. J. W.—Your inquirer, "G. J. W.," will find his queries Nos. 1 and 7 discussed in Lindley's "Elements of Botany," also in Hunt's "Poetry of Science." Experiments demonstrating the effects of sunshine upon combustible matter, by Professor Tomlinson, are referred to in "Popular Science Review" for October, 1870. Having great doubts in the matter of borax being obnoxious to the common cockroach, I threw a quantity of the powder upon one placed in a gallipot. It lived for

six days. This fact shows how little dependence can be placed in the efficacy of the remedy.—*Henry J. Bacon.*

Stove for Conservatory.—Can any of your readers recommend me to a very small "portable" stove? Some years since I read in one of the scientific journals, that if a "stone jar painted black" and filled with hot water at night, were placed in a room with tender exotics, sufficient heat would be radiated to obviate the effects of frost for twelve hours. It failed in my hands, the jar becoming cold in a little more than an hour.—*S. H.*

Age of Geese.—As to the age geese may live, raised by one of your correspondents, a tradition exists in the north that they may live to be a hundred years of age. The following, written thirty years ago, refers to the prevalent idea.

> "Good Mrs. Nixon had been told,
> That geese a hundred years might live,
> The fact appeared so strange and bold,
> She scarcely could the thing believe.
>
> "But, exclaimed this wife of sense,
> 'I'll soon the information try,
> I'll buy one, 't wont be much expense,
> And then I'll see if it's a lie.'"

—*J. Brittain.*

Cockchafers.—Can any of your correspondents inform me how long the common Cockchafer (*Melolontha vulgaris*) remains in the larva state? Early last April I turned out of an old vegetable-marrow bed a considerable number of what I imagined to be the larvæ of this or some other lamellicorn coleoptera. They were thick, fleshy, cream-coloured grubs, about an inch in length, possessing six short-jointed feet, and having the hinder part of the body bent down so as nearly to approach a distinct head, in which position they remained, though exposed some time to a hot sun. All these larvæ were full-fed, and apparently ready to undergo their metamorphosis, and were found at various depths in the soil; but I could not discover the rude cocoons in which they enclose themselves prior to their last transformation. Last year my garden was visited by great numbers of the Rosechafer (*Cetonia aurata*), but I know not how to distinguish the larva of this beetle, or that of the Summer "Dor" (*Risotrogus solstitialis*) from the larva of the large Cockchafer. The time of the appearance of these chafers I know is very uncertain, but the sun-loving Cetonia was on the wing early in May, 1870, when it ruthlessly destroyed the blossoms of the Weigalia, the Syringa, and white peony weeks before their favourite food, the roses, came into bloom. I have seen but one Cetonia this year, which I took on the 9th of this month (June). This beetle I find is particularly fond of the early white pink, tearing its petals to atoms with its curved mandibles and hooked feet. Do any of the above beetles afford that irritant and still imperfectly-known substance which has the effect of raising blisters upon the human skin, like the *Lytta vesicatoria* of Spain, the *Meloe trianthema* of India, or the *Mylabris variabilis* of China; or is it known whether the larvæ of these insects supply in any remarkable degree vesicating properties? Some of the British Meloe do possess the blistering principle. A relative who has just returned from Zurich tells me that "this town has a periodical visitation of cockchafers, or, as the people call them, *moicaefers*. These insects return in such quantities every *four* years that there is a special law made to destroy them. Every gardener is expected to bring his peck of those he has destroyed, and they who bring above a certain quantity receive a reward. You cannot walk under the chestnut-trees without treading upon many of these beetles, or seeing the effect of their ravages overhead. The people say in Zurich that the insect in its two previous stages occupies nearly three years, and then takes wings and its destructive shape. It used to be a pleasant thing for boys to hunt cockchafers, but I never dreamt of their becoming like the plague of locusts. In the cemetery where our late lamented relative is buried, I saw a tomb, on which at the foot was represented a caterpillar, above it was the same insect in the larva state, and finally it was assuming the wings of a butterfly and taking flight upwards, an allegory as full of meaning as that on a Roman tomb, where a ship is represented furling her sails and entering her haven."—*Henry Moses, Reading.*

Primroses changing Colour (pp. 133 and 134).—I have heard of both primroses and cowslips turning pink or crimson, when manured with cow-dung; and am told of a case in which the same thing occurred on transplanting yellow specimens from the fields to a garden; where the soil would doubtless be richer.—*G.H.H.*

To Destroy Worms.—Take a large tub, say half a hogshead. Put into it the third of a bushel of fresh-burnt lime. Slake the lime by pouring on it a small quantity of water. When the lime is slaked, fill up the tub with water; stir up the lime well two or three times a day, for two or three days; then let it stand perfectly still: the lime will subside to the bottom of the tub, and the water will become quite clear, of a bluish colour. In the middle of the day, when the sun is shining bright, take this clear water in a watering-can with a rose on it, water the part on which you wish to destroy the worms. In a few minutes they will come to the surface and the sun will destroy them.—*J. B. Gainford.*

Water-Snakes. — In the June number of Science-Gossip, your correspondent, "W. C. P." writes thus from Whitebrook, near Monmouth:—"Water-Snakes.—There is a sort of *fish* (I suppose) found in springs here; it is about a foot or fifteen inches long, and about as thick as a stout horse-hair, called here a water-snake." This is the hair-worm, a curious creature, of which the exact place in systematic zoology has hardly yet been determined, the *Gordius aquaticus* of Linnæus. By systematists it is usually put near to, or with, the round intestinal worms of man and lower vertebrates. The early period of its life is passed parasitically in insects, from which it escapes, and becomes free in streams and pools of fresh water. Unlike intestinal worms, it has no posterior or anal opening. The sexes of *Gordius* are distinct; the tail of the male forked or bifid, that of the female only rounded. Any observations of the structure and development of this curious creature would be interesting to zoologists. —*G. G.*

A Budget of Queries in your June number is not without interest. Query 4, "On the change of colour in certain animals in winter," your correspondent will find answered very scientifically in the late Dr. Davy's "Physiological Researches," 8vo. 1863, wherein is a chapter, xxxix., treating of the question of the sudden change of colour in the hair, and the whitening of the clothing of mammals and birds in winter.—*G. G.*

NOTICES TO CORRESPONDENTS.

E. L.—We had no solution to offer.

J. B.—The Italian fungus-stone is mentioned by Dr. Badham, and you give no additional information.

M. D. P. wants to know of any other birds (except pigeons) that feed their young in the same manner as the canary.

B. W. P.—Probably a boraginaceous plant, but we should not attempt to name it from a fragment of a leaf.

H. M.—We have already given instructions for cleaning diatoms, in early volumes of S.-G. No. 1 is *Coleosporium pingue*. No. 2. *Junia rubens*.

W. G.—The insects on bark are *Adelges corticalis*, often very injurious to pine-trees.

S. H.—We make it a rule not to recommend any particular tradesman or firm. Your first query you will find answered in treatises on bleaching. We do not remember who is the publisher of "Solly's Analysis of Plants."

H. A.—Lots of white mice.

J. H.—You will find some communications on the spider swallowing its web in our first volume.

R. G.—Undoubtedly the plants spring up from dormant seeds, which may vegetate after being buried very many years.

H. C. H.—*Vaccinium vitis idæa*. The other subject is wholly a matter of taste, for which no law can be given.

J. B. D. will find Cooke's "Manual of Structural Botany" (one shilling), and "Manual of Botanic Terms" (half a crown), published by Hardwicke, 192, Piccadilly, just what he asks for.

R. G.—No manual of Coleoptera has been published since Stephens's, which is very much out of date.

H. A. S.—Not a fern at all, but a fungus on leaf of betony, *Puccinia Betonicæ*.

W. A. C.—The address being given, you had better apply direct, as we object to advertising prices.

E. L. (Hull).—Use dammar dissolved in benzole in the same way as Canada balsam is used. Experience will test its advantages. We always use it in preference to balsam, as no heat is required, and it soon becomes hard.

A. R. G. inquires for a Field Club in S.W. London, for Kingston, Wimbledon, and the neighbourhood. We know of none.

W. G.—The Uredo on rose is not the common rose-rust, but apparently *Coleosporium pingue*.

W. W. H.—The hairs from the stipes of an exotic fern, probably a *Cibotium*.

W. C. P.—We cannot answer your question. The means were at your hands, by examining microscopically, or testing the water, to discover the cause.

J. H.—Science-Gossip is now generally ready two or three days before the first of the month.

G. D.—We do not remember any detailed account of the chemical and physiological effects of viper poison except in "Christison on Poisons."

F. G. complains that borax will *not* destroy cockroaches. Similar testimony is given in the present number. Beetles are insects, of course, and the question, "Do insects grow?" was discussed in an early volume of S.-G.

R. H. W.—We know of no work containing the desired information on dry rot. Several communications are scattered through the volumes of the "Gardener's Chronicle."

W. D. R.—We should think that Grindon's "British and Garden Botany" (Routledge), or Bentham's "Handbook of the English Flora" (Reeve), would suit you.

Miss G.—The insect is a water mite; it belongs to *Acarini* and the genus *Hydrachne*; the growth on *Valisneria* is Conferva.

J. S.—It is *Trichobasis compositarum*; the fly is *Chrysis ignita*.

W. D. R.—No. 1 is *Phyllobius argentatus*, Linn.; No. 2 is *Sitones lineatus*, Linn.—*E. C. R.*

H. M.—Possibly a new volume on insects published by Lovell Reeve & Co. It is difficult to recommend a *small* volume for such a wide range of subjects.

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

British and Foreign, land, freshwater, and marine shells for foreign land or freshwater ditto, or Tertiary fossils.—G. S. T., 58, Villa Road, Handsworth, Staffordshire.

Sections of Rush, showing stellate tissue (see Davies), skin of frog, &c., unmounted, for other good objects and stamp.—C. D., 187, Oxford Street, Mile End, E.

British Plants (dried) for exchange.—J. H. L., 180, Mill Street, Liverpool.

For Palates of *Neritina fluviatilis* and *Paludina vivipara* (unmounted) send stamp and objects of interest to H. M. J. Underhill, 7, High Street, Oxford.

Sertularia operculata.—Send stamped envelope to F. S., 16, Crooked-lane, London Bridge, E.C. (Any microscopic object or material acceptable.)

Carboniferous Fossils for *Coronella lævis*, Smooth Snake or *Zootoca vivipara*, the Common Lizard.—F. R. Stephenson, Salterhebble, Halifax.

Potentilla rupestris, *P. fruticosa*, *Draba aizoides*, *Euphorbia pilosa*, *Dianthus cæsius*, &c., for other rare plants.—W. Todd, 2, Blundell Place, Leeds.

Leaf Fungi, Lichens, &c. (unmounted), for objects of interest unmounted.—H. D., Claremont House, Waterloo, Liverpool.

An American entomologist, who has made lepidoptera a speciality, would like to correspond and exchange with an English gentleman interested in that order. Please address K. K., care of E. K. Butler, Esq., 68, Pearl-street, Boston, Mass., U.S.

Wanted *Veronica verna* for *V. triphyllos*, and *Dianthus deltoides* for *Dianthus cæsius*.—Mrs. C. F. White, 42, Windsor Road, Ealing.

Rev. J. Hanson, 11, Bagby Square, Leeds (late of Elmwood-street) offers *Ichneumon gregarinus* for microscopic material.

Spicules, cleaned, of *Pachytisma Johnsonii*, four-pronged sponge, *Synapta inhærens*, *Tethea Lyncurium*, and coloured Gorgonia offered for other spicules or material.—C. E. Osborn, 28, Albert Road, Upper Holloway, London, N.

Jutland Deposit.—Slides of Diatoms from Mors (coarse and fine) offered for first-class slides of other objects, especially entomological.—M. M., care of Editor.

Dutch Shad Scales prepared for mounting. Send stamped envelope.—J. H. M., 17, Walham Grove, St. John's, Fulham.

Wanted, Nos. 17, 47, 93, 263, 289, 302, 307, 483, 491, 686, 700, 873, 1041*, 1064, 1092, 1242, 1251*, London Catalogue of Plants, for 149, 313, 326, 677, 965, &c.—F. A. Lees, Meanwood, Leeds.

Zoophytes.—Various species well mounted in balsam for other good *named* slides.—Address E. Ward, 9, Howard Street, Coventry.

BOOKS RECEIVED.

"Monthly Microscopical Journal," for June, 1871.

"Journal of Applied Science," for June, 1871.

"The Alleged Historical Difficulties of the Old and New Testaments," by Rev. G. Rawlinson, M.A. London: Hodder & Stoughton.

"Positivism: a Lecture delivered in Connection with the Christian Evidence Society," by Rev. W. Jackson, M.A., F.S.A. London: Hodder & Stoughton.

"The Canadian Entomologist." No. 12. Dec., 1870.

"Botanical Notes," by D. A. P. Watt. Reprinted from the "Canadian Naturalist."

"The Animal World," for June, 1871.

"Canadian Entomologist." Vol. III., No. 1. April, 1871.

"The American Naturalist." June, 1871.

"Proceedings and Communications of the Essex Institute." Vol. VI., Part 2. 1868-71. Salem, Mass., U.S.

"Descriptions of some new or little-known Oaks from N.W. America." By Robert Brown, of Campster, M.A., &c. Reprinted from "Annals of Nat. Hist.," April, 1871.

"On the Physics of Arctic Ice as Explanatory of the Glacial Remains in Scotland." By Robert Brown, of Campster, M.A. &c. Reprinted from "Quart. Journ. Geol. Soc.," February, 1871.

"Land and Water." Nos. 280, 281, 282, 283.

"Mycological Illustrations: being Figures and Descriptions of new and rare Hymenomycetous Fungi." Edited by W. W. Saunders, F.R.S., and W. G. Smith, F.L.S., assisted by A. W. Bennett, M.A., F.L.S. Part 1. Van Voorst.

"List of Coleoptera collected by J. K. Lord, Esq., in Egypt, &c., with Characters of Undescribed Species." By Francis Walker, F.L.S. London: Jauson.

"The Boston Journal of Chemistry," for May, 1871.

Communications Received.—G. R.—E. H. V.—H. D.—W. W. H.—E. L.—B. W. P.—W. A. C.—M. Q. M. C.—T. T. S.—G. D.—J. S. T.—J. H.—W. C. F.—C. S. K.—W. G.—H. E. W.—R. S. H.—H. A. S.—F. W.—J. H.—S. H.—H. W.—J. D.—J. H.—H. L.—A. R. G.—H. D.—R. C. S.—C. C.—W. C.—C. F. W.—K. K.—H. C. S. S.—C. E. O.—S. H.—H. C. S.—H. M.—H. E. W.—J. H. M.—T. G. D.—E. S.—G. R. D.—W. E. S.—E. L. R.—H. M. J. U.—W. D. R.—J. S., Jun.—F. S.—G. H. B.—F. A. L.—H. A.—J. B. D.—H. M.—H. J. B.—R. G.—C. A.—F. B.—W. T.—B. W. F.—S. P. H. B.—C. J. D.—G. H. H.—J. B. G.—J. H. L.—G. G.—H. C. H.—F. R. S.—R. G.—G. S. T.—J. H.—G.

THE TRAWL.

By MAJOR HOLLAND.

"——— My soul is full of longing
For the Secret of the Sea,
And the heart of the great ocean
Sends a thrilling pulse through me."

READER, do these words of Longfellow come home to you? does any responsive chord in your own heart vibrate in sympathy with the spirit of the poet who has drawn a flood of inspiration from Nature's fountain, and penned many a deep lesson for us? Another great spirit, one that has lately left us, a strong and resolute yet tender and sensitive soul, that wore in this life the outward mask of a hard-lined deeply-furrowed face, told us, with all the exquisite delicacy of its gentle pathos, how the wild waves ever talked to little Paul Dombey, whispering to the wondering heart of the fast-failing child, of that unknown and unfathomable ocean upon whose eternal bosom his tiny skiff was to be launched so early. Reader, do the deep mysterious tones of the grand utterances of the great deep ever speak to *You?* Open wide the ears of your understanding and listen reverently when you are all alone with the mighty Sea, and mayhap you will one day catch an inkling of the divine secret it is ever striving to reveal.

Of all the 31,465,480 true Britons reckoned up in the census of April, 1871, how many individual units have ever passed even one entire day and night of twenty-four hours under the open sky alone with Nature? It is not a very marvellous feat to perform, yet it is a very uncommon one. We are indebted to the humorous pencil of Leach for a sketch of a languid gentleman who, pining for a new sensation, is trying the effect of riding up and down the Strand, seated on the roof of an omnibus and picking out periwinkles with a pin. Should you ever feel as though you had exhausted all the resources of the civilized portions of the globe, do not seek for distraction in boiled cockles or in pickled whelks, but take a railway rug and a stout stick, a pipe, and a moderate provision of meat and drink, and get away to the top of a hill, with woods and streams, and smiling fields dotted with farmsteads and villages spread before your feet, and there rest in solitude and wait on Nature, and listen and watch for all that she will do and say in earth, air, and sky, and for all that her offspring will do above, below, and around you while this teeming planet turns once around its axis. Then seek a similar communion with the Sea; study it from even-fall to broad daylight from the top of some lone unfrequented cliff; or better still, commit yourself to the heaving bosom of the great waters, and unless your soul be blind and deaf, you shall learn things never dreamt of before in your philosophy. Words cannot convey it, "The Secret of the Sea" must be sought after by each one for himself.

But let us first pass a night together; off the coast, in one of the toiling striving solitary smacks that fight single combats with the billows and wrestle with the winds, and struggle on in cold and rain, and gloom and fog, all through the lonesome hours of the dark night, to win from the gravel-beds and shingle-banks, from sandy spits and parks of sea-grass, and from the mud and ooze deep down beneath the keel, the brown soles whose savoury *filets* will smoke on our breakfast-tables in the morning, and the crimson lobsters and the glossy pink prawns for the cool salads of these hot dog-days, and a score or two of other welcome luxuries, dearly won for us by hard horny hands and honest

aching backs (sometimes, alas! with aching hearts) while we have been softly nestled on our pillows.

Come and let us see what we can find on the feeding-grounds of Davy Jones's domain, down on the sea-bed.

In September, 1869, we found a goodly store of life "Under the Scaweed," in a matted flake of stranded rubbish cast up upon the beach; and in the same month of last year we skimmed the smooth surface of the Solent on a still night with "The Towing-net," and took more than anybody could describe in a fortnight. Now let us try whether with "The Trawl" we cannot bring to light some of the many living things that dwell deeper down in the same well-known inner sea.

beam, and skid along the bottom; the upper edge of the mouth of the net is fastened to the beam, the lower lip of the net is fastened to the ground-rope, a strong rope covered with green hide and weighted with leaden plummets to keep it dragging along the bottom; its two ends are fastened to the lower and hinder end of the heads; thus the upper lip projects some two feet above and in advance of the ground-rope, which is the first thing to alarm the fish at the bottom. If the latter rise, as they nearly always do, they are stopped by the overhanging upper lip, and the speed of the vessel soon sweeps them into the belly and cob of the net.

At Portsmouth and Gosport, and in every port and haven from which fishermen put to sea, there

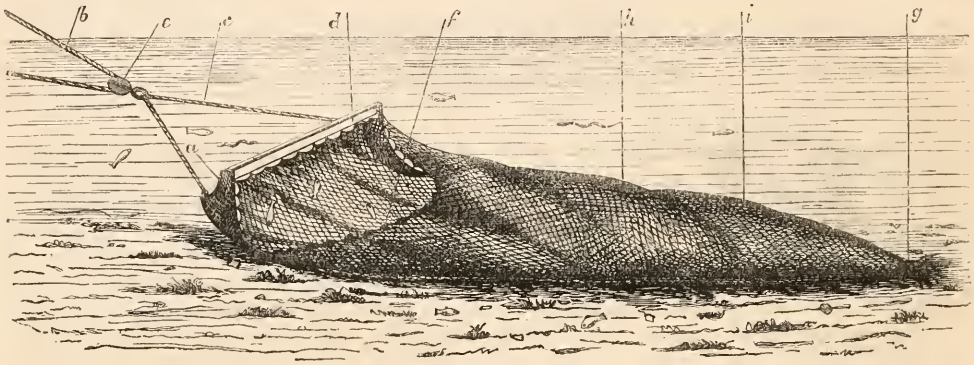


Fig. 87. The Trawl.

In this figure, *a* denotes the iron "head," *b* the warp, *c* the guy, *d* the trawl-beam, *e* the trawl-warp-block, *f* the ground or bottom-rope, *g* the seizing or lashing of the cob, *h* the belly of the net, *i* to *g* the cob: the cob or end of the bag of the net has a wide opening, through which the contents are taken

are respectable men to be found with smacks equipped with every requisite, who will take people out with them for a very moderate charge, at a few hours' notice. And now while our trawl is gathering a great draught for us, let us consider for a few minutes the nature of Fishes in general.

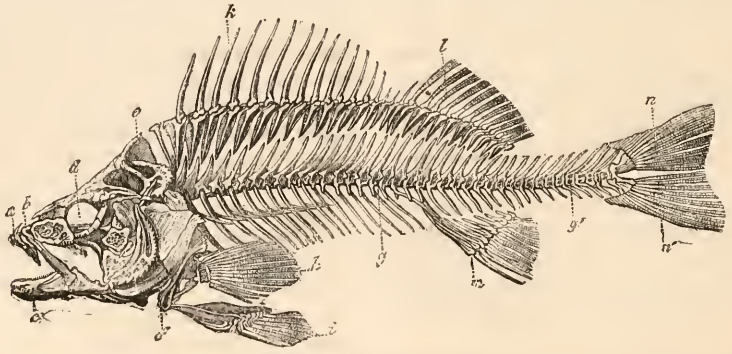


Fig. 88. Skeleton of the Perch.

out; it is kept closed by the lashing or seizing. There are many patterns and sizes of trawls; this is a small one, a prawn trawl, about seven feet wide at the mouth, and fifteen feet in length, and is worked from a half-decked cutter-rigged craft of twelve tons; the "heads" are two heavy iron plates which form a sort of sledge-runners to support the

The skeleton of the Perch is inserted for the benefit of those who have never examined the bony framework of a fish, and who may be unacquainted with the names of certain parts thereof which we shall frequently have to mention; to those who wish to go further into the subject, we recommend "Owen's Hunterian Lectures, vol. ii. part I.

Fishes," or his more recent and costly work on Comparative Anatomy. In fig. 88, *a* marks the inter-maxillary bone, which forms nearly the whole of the border of the upper jaw; *b*, the maxillary bone; *c*, the mandibular bone, or lower jaw; *d*, the cavity for the eye; *e*, the inter-parietal bone; *f*, the inter-operculum,—"this bone furnishes an attachment to the branch of the hyoid bone, at the point where it is itself attached to the styloid, which suspends it on the temporal bone; hence the opercular shutters cannot open or close without a corresponding movement of the hyoidean arches": the curved, serrated bone seen immediately above it, is the pre-operculum, to the right of which is the large triangular operculum, with the sub-operculum below it; these four opercular bones form the framework of the outer gill-covers: *g g*, the vertebral column; *h*, the pectoral fin; *i*, the ventral fin; *k*, the first, and *l* the second, dorsal fin; *m*, the anal fin; *n*, the caudal fin.

The Fishes are the lowest class of the Vertebrate division of the Animal Kingdom; the construction of their cerebral system and every part of their economy indicates their inferiority to Reptiles, Birds, and Mammals. Their blood is red, but they are "cold-blooded." Every one has heard of Humboldt's Volcano-fish found living in water at 210°; and we have ourselves taken Siluroid fishes from one of the hot springs in Carson Valley, at the foot of the eastern slopes of the Sierra Nevada, the water of which threw up clouds of steam, and almost scalded the hand; the temperature of the bodies of these particular examples must of necessity have been exceedingly high; nevertheless, Fishes are essentially "cold-blooded." The sight of some of the freshwater tribes is both quick and keen; hence the nicest dexterity of manipulation is indispensable in tying a fly for trout. The eyes of the mackerel and of most of the marine genera seem to be equally quick, but far less discriminating; and we see them captured wholesale with hooks unbaited, but made attractive by clumsy lures of glittering bits of glass or metal, or strips of bright-coloured cloth, or by a tuft of white feathers trailing astern of a boat in motion; and it is no uncommon thing for them to take an entirely naked hook as it flashes through the water. The popular notion that they are deaf is altogether erroneous; their hearing is probably dull, but from the humble auditory apparatus of the lampreys, through an ever ascending gradation of organization up to the sharks and sturgeons, all are provided with a mechanism of varying degrees of perfection, adapted for the reception and transmission of sonorous vibrations.

What shall we find in the first haul? The strain upon our expectant curiosity is almost more than we can endure. "What will there be in the net?" "Do you think there is anything in it by this time?" We can't wait any longer; so let us clap on to the trawl-warp and rouse it in. Here come the iron heads; now get well hold of both ends of the beam while the man takes in the slack of the warp; give a "one,"—"two,"—"three!" and in comes the heavy framework over the quarter; gather in the ground-rope; gently now, with that great conglomerate bolus of fish and shells, and seaweeds and rubbish, and nobody knows what;—gather in carefully, and don't tear the meshes; land the whole concern in the stern-sheets, which are decked over and fitted with "cants,"—*i.e.*, with high sills, to keep the ooze and slush from running all over the place. Cast off the seizing of the cob, and shake out the treasures.

"Look out, sir! look out! here be a Sting-fish; dont-ee touch un; mind your hands, sir, he be awful pīsen!" Let us follow the mate's advice, and before precipitating ourselves frantically upon that kicking, jumping, flapping, wriggling heap of sea-life before us, let us carefully "eliminate" this innocent-looking, but really dangerous customer—*Trachinus vipera*, the Lesser Weever, Otter-Pike or Sting-fish.

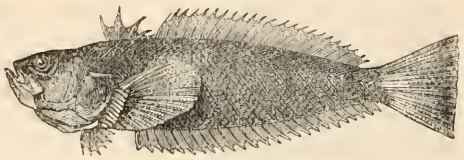


Fig. 89. The Lesser Weever (*Trachinus vipera*), ½ nat. size.

He is a a wicked rascal; he lies still until something comes well within his reach, and then bounds up and strikes furiously, driving the strong, sharp, penetrating spines of that terrible little "first dorsal" deep into the hands of the unwary. The idea that the swelling and inflammation of the arm, that often supervenes after receiving one of his well-delivered hits is produced by "pīsen," was for a long time ridiculed. The following footnote to a paper by Dr. Günther, in "Annals and Magazine of Nat. Hist.," p. 458, vol. xiv., A.D. 1864, may tend to convince the sceptics that the fishermen are right after all:—"Dr. J. E. Gray has directed my attention to a paper by Mr. Byerly in the proceedings of the Literary and Philosophical Society of Liverpool, Nov. 5, 1849, p. 156. In this paper Mr. Byerly demonstrates in the most convincing manner, that the double-grooved opercular and dorsal spines of the Weevers are poison-organs. Although the structure of the spines, with their external grooves, were known to previous writers, it is Mr. Byerly's merit to have shown the presence of a cavity within the substance of the spines, which is the proper depository of the poison before its ejection." Here the learned Doctor takes exception to

some matters of detail, but concludes with,—"Nevertheless, there is no doubt that the poison apparatus of *Trachinus* is homologous with that of *Thalassophryne*, only in the latter it is developed to as great a perfection as in the fang of the viper." He is of a peculiar light yellow-grey, dashed with a reddish tinge about the back, the lower parts being much lighter, and gradually passing into white; the fins are brown, the caudal being edged with black, and the first dorsal webbed with a jet-black membrane, which happily presents a decided means of instantaneous identification. He is one of the Perch family, an uncomfortable set to handle; it is as well to remember that they are called *Acanthopterygii* (ἄκανθος, a spine, and πτερύγιον, a fin), from the stiff spines which constitute the first rays of the dorsal fin.

The "Great Weever," or "Sting-Bull,"—the "Sea-Cat" of the coast of Sussex,—is a very much larger fish: "its food is the fry of other fishes, and its flesh is excellent"; nevertheless, it is generally thrown overboard as worthless; and if it thus escapes with life, it lives only to destroy the more valuable sorts.

What is all this loud chorus of croaking and smacking of lips, suggestive of the second plague of Egypt combined with a lot of greedy *snobiculi* let loose upon strawberries-and-cream? These sounds are all produced by the sucking and gasping of the wide-gaping mouths and labouring gills of a couple of dozen of spiny horny-headed prisoners. Lift that one up by the tail, or rather by the caudal fin; formidable and forbidding as his appearance is, he cannot jump and strike like the harmless-looking Weever;—this is *Cottus bubalis*, the Long-spined Father-lasher; the boys often call it the "Bull-head," confounding it either with the true saltwater "Bull-head," or with the freshwater species of that name, *alias* the Miller's-thumb. The French call these croakers, *Grogneurs*, *Coqs-de-mer*, and *Coqs-bruyans;* the Germans call them *See-murre*, or Sea-grumblers. Fisherfolk in the Mediterranean once had a belief that their hoarse notes foretold dirty weather: "ils répètent ce bruit à l'approche des tempêtes."

Cottus will live for an hour or two out of the water, not because he has wide gills, but because he is a ground fish; "the surface-swimmers, with a high standard of respiration, a low degree of muscular irritability, and a great necessity for oxygen, die almost immediately when taken out of the water, and have flesh prone to rapid decomposition: on the contrary, those fish that live near the bottom have a low standard of respiration, a high degree of muscular irritability, and less necessity for oxygen; they sustain life long after they are taken out of the water, and their flesh remains good for several days: carp, tench, eels, the different sorts of skate, and all the flat-fish may be quoted." Now this tenacity of life in the Cottus, the Weever, and a dozen others like them, is, combined with our stupid way of dealing with them, a commercial calamity; for while the young of most of the valuable food-fishes die almost immediately they are taken out of the water, and, unless of marketable size, are thrown overboard dead, and wasted, these voracious poachers, regarded as unclean by the people of our islands, are thrown back alive into the sea to destroy by the million the fry of their betters.

We are wrong in treating the Cottus as a worthless thing. "In Greenland it attains a large size, and is in such great request, that it forms the principal food of the natives: the soup made from it is said to be agreeable as well as wholesome." Caught by the score at every "heave" of the trawl, and by hundreds of tons in the course of the year, yet never eaten in this densely-peopled country, where meat is so sadly dear and there are so many half-filled and all but empty mouths; caught by millions, and good for food, yet put back into the sea as useless; our ignorance or prejudice combining with their natural tenacity of life to preserve them only to do mischief. Here is a blunder in our piscine economy to be put to rights. It is said that once upon a time the good people of Looe, down in Cornwall, ate all their rats to make sure of getting rid of them; and quite recently the abominable grubs of the cockchafer, the arch-pest of French horticulture, became a fashionable dish in *la belle France*. We do not envy the west-country folk their rat pies, and we are content to leave Parisian gourmands to feast alone upon *vers blancs;* but here we have a clean-feeding fish, "agreeable as well as wholesome," which, together with a dozen other kinds at present wasted, and worse than wasted, might be converted into nutritious soups and stews, or such savoury compounds as Thackeray found in a snug restaurant in the "*Rue neuve des Petits-champs*."

> "This *Bouillabaisse* a noble dish is,
> A sort of soup, or broth, or brew,
> Or hotchpotch of all sorts of fishes,
> That Greenwich never could outdo;
> Green herbs, red peppers, mussels, saffern,
> Soles, onions, garlic, roach, and dace;
> All these you eat at Terré's tavern,
> In that one dish of *Bouillabaisse*."

Here is another of the same race, with shorter spines about the head, and three hooklike recurved spines on the snout; the body is octagonal and covered by eight rows of strong plates; the chin is furnished with several minute cirrhi. This is a mail clad Cottus, the "Armed Bull-head," "Pogge," or "Sea-poacher." The scientific name seems to be a corruption of ἀσπῐδη-φόρος, *shield-bearing*. "Its flesh is good and firm," but prejudice rejects it as unfit for food, and reckless ignorance preserves it to poach

upon the young prawns and other "merchantable" things which are diminishing in an alarming manner with each succeeding year; everybody is crying out about the awful price of oysters and prawns and all other sea food, but nobody stops the wanton mischief that makes the scarcity.

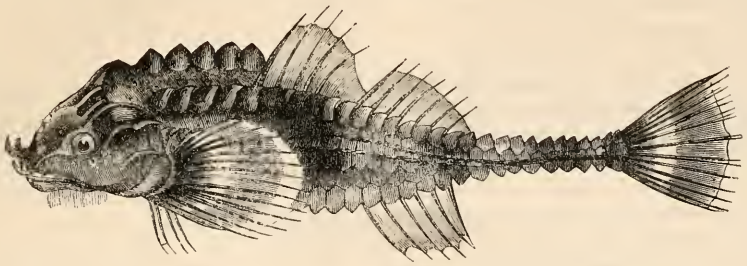


Fig. 90. The Armed Bull-head, or Pogge (*Aspidophorus Europæus*).

Here is a Rock-Goby, *Gobius niger*, the largest and rarest of the eight species of the Goby tribe which have been described and classed as British. A specimen which we captured on the Horse shoal lived and thrived in the aquarium for seven months. Although a veritable *niger*, he was not by any means black, or even dark, nor did he turn black when irritated or excited. Observation has convinced us that many aquatic creatures, especially when young, vary so immensely in their colour and general outward appearance in different localities, that they can only be distinguished and identified with certainty by a careful examination. Our prisoner was of a light yellowish-brown, and mottled about the back with a darker brown, with a few purplish spots on the dorsals and a row of greenish-brown marks along the median line: no doubt his coat was adapted to the colour of the gravelly bed on which he dwelt; perhaps if his lot had been cast upon a blue-clay bottom, he would have assumed a more Æthiopian hue. He was very wild and shy, hiding for weeks together behind stones and weeds; he would dash out savagely at a morsel of meat, and dart back again to his lair like a flash of lightning. These movements were executed so rapidly that the eye scarcely received any distinct impression of the animal itself,—a streak of light and a disastrous upsetting of miniature groves and grottos, and a whirling about of the bits of rubbish stirred up from the bottom, were the indications of one of his hungry raids. The ventral fins are arranged in a very remarkable manner, being united together by their anterior and posterior edges; the pair thus forming a kind of oblique *infundibulum*, the so-called "sucking-fin," which is not very easy to describe, but may perhaps be understood on referring to fig. 91, where it is well shown. We took the idea of this figure from Yarrell, but it has been drawn to life size, from one of our own specimens.

It has been suggested, rather than asserted, that by means of this peculiar compound hollow fin the Rock-Goby can attach itself to rocks in a vertical position, on the vacuum principle. This particular specimen never made any such use of it; he invariably grovelled on the bottom *ventre à terre*, as flat as a flounder. A small and very tame successor who is at present our guest, swims about freely. The spiny sticklebacks, though nearly twice his size,

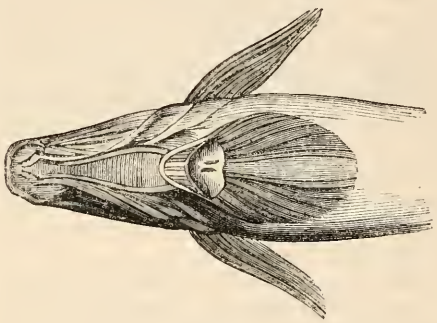


Fig. 91. The Rock-Goby (*Gobius niger*). Ventral aspect.

have a great respect for him; he has no hesitation in charging straight into the middle of half a dozen of them and taking away a piece of meat which they are quarrelling about. After watching him daily for weeks and weeks, we began to feel sure that the idea put forward in a doubting sort of way by Montagu and others about the Goby's habit of adhering to plane surfaces by the "sucking-fin" was a myth; when behold, at last, we found him most unmistakably affixed by the said contrivance to the smooth side of the polished plate-glass of his house-of-detention, where we had ample opportunity of scrutinizing his united ventrals with a pocket lens. It required some little force to remove him from his hold with a netting-needle. We have no longer any doubt on the point ourselves; and it has been satisfactory to find, on rummaging amongst the heaps of valuable odds and ends in the back numbers of SCIENCE-GOSSIP, that another correspondent (page 42, Feb. 1865) is equally certain. We expect shortly a deposit of eggs by the prisoner's wife, and

it will be interesting to observe whether he will be as chivalrous as the representatives of his race spoken of in the paper to which we have alluded. These conjoined ventrals appear to be quiescent when their proprietor is swimming horizontally, but they are in great requisition when, by a succession of upward leaps, reminding one of the rising lark, he brings himself to the surface of the water: on these occasions they seem to be sharply contracted and flattened in, so as to throw a little column of water downwards.

The Blennies, Gobies, and Dragonets, though placed in the same family, *Gobiadæ*, by some writers, are really three distinct groups. These can never be mistaken for each other by anybody versed in ichthyology; but as we gossip for the young, and for those who are not blessed with extensive libraries, and as both Gobies and Blennies are commonly found together in the same tidepool, we do not hesitate to point out their distinctive characteristics. The Gobies may be known at once by the union of the ventral fins, and they have two distinct dorsals; while the Blennies have but one dorsal. This being bilobate in some species, may be mistaken for two by people who are not given to close observation. The ventrals are free, and of very unimportant dimensions, "formed of two rays only," and placed close up to the throat, in front of the pectorals, they look like a clergyman's bands, and are mere appendages. The pectorals are largely developed, and they climb and hop and walk with them (if one may thus apply the expression) in an awkward jerking manner. The pectorals of the fish are the homologues of the arms of man, and the ventrals of the class *Pisces* bear the same relation to the legs of *Homo*. A few years ago a poor afflicted specimen of the latter genus, a *Cul-de-jatte* with an imploring pain-wearied face, haunted (and perhaps still haunts) the sunny side of Regent Street: unable to swim, he compared disadvantageously with his aquatic analogue; but his terrestrial locomotion was performed like that of the mud-scuffling fish; he was a human blenny, and propelled himself over the muddy stones by means of his strong arms, his well-developed pectorals; while his withered legs, weak ventrals, "of two rays only," hung powerless and useless in front of him, as "mere appendages."



Fig. 92. The Blenny.

The name Blenny is an old one; we find it in Aristotle, and the meaning of βλέννος is *slime* or *mucus*. The same fish is called by another Greek writer the βλέννος or βαιών,—from the latter word its French name (*Baveuse*) is probably derived. Our own Blenny (fig. 92), recently deceased, was unlike any we have seen described anywhere; he was of an olive-green on the back, with blue shades here and there, and bright white spots, and he had gorgeous spots on his fins: he was something like Montagu's Blenny, but the crest was wanting; and he certainly was not a "shanny": he was a very friendly, sociable little fellow, and lived in peace with the prawns and sticklebacks; the slightest tap on the glass would bring him forth, and he would follow the finger about and take food from the hand. He was exceedingly sensitive to the vibrations of stringed instruments; the softest note of a violin threw him into a state of agitation, and a harsh scrape or a vigorous *staccato* drove him wild, causing him to dart about and leap violently out of the water. The big Rock-Goby, who was for seven months his obstreperous companion, became so addicted to eating his neighbours, and caused such ruinous cataclysms in the mimic ocean-garden after he had grown to be five inches in length, that sentence was passed upon him; he was netted and dropped into a large freshwater bath, in which unnatural medium he was bound (according to the books) to die forthwith without any pain; but, with the exception of a somewhat quicker and more laboured action of the gills, he appeared to be nothing disconcerted by thirty-six hours' immersion. Having thus, at the peril of his life, refuted the popular notion that sea-gobies die instantly if transferred to fresh water, and having been deprived of liberty for many months for our behests, we felt under an obligation to him; besides, what right have we to destroy a life wantonly—ay, even though it be but the little life of a mute helpless Goby? So we put him into a jar, and on a bright evening in the merry month of May, when all Nature was rejoicing in the balmy glow of spring, we set him free in his own unfettered sea, among the bright rippling wavelets of the glistening Solent, wishing him all the happiness that it may be within the capacity of one of his race to enjoy. Perhaps by this time he has found a sympathetic Gobéina, and they twain may have arranged to build a nest and to rear whole troops of little Gobikins amongst the sheltering stems of the forests of laminaria.

Here is *Gobius albus*, the White Goby; and two of the Dragonets—*Callionymus Dracunculus*, the "Sordid Dragonet," and *C. Lyra*, the "Gemmeous Dragonet." The first is very common; the latter, which is less frequently met with, is brilliantly coloured, is easily acclimatized, and thrives in captivity. The branchial aperture, which is but a small orifice on each side near the nape of the neck, will distinguish *Callionymus* from the other genera.

Here is a curious fellow, with a pentagonal body, an elongated head and snout, and a tapering, snaky

tail, looking like a crossbreed between the "Shield-bearer" and a Pipe-fish,—this is the Fifteen-spined Stickleback, *Gasterosteus spinachia*—the "Great Sea-adder" as the west-country people rather magnificently call him. We have half a score of them here. A small specimen is a pleasing object in

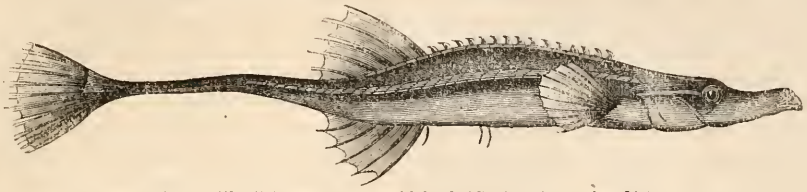


Fig. 93. The Fifteen-spined Stickleback (*Gasterosteus spinachia*).

an aquarium: he is not completely clad in mail, but is "partially armoured," like some of our men-of-war. The lateral line is marked by a series of carinated scales, and the two elongated plates underneath him have given him the title of γαστήροστέος (bony-belly). "It is very voracious, swallowing indiscriminately the fry of other fishes."

The common Sticklebacks, the three- and four-spined, are among the hardiest of all our sea captives; they will live under the most trying and unnatural conditions;—their bright, flashing, silvery scales, their lively motions, and constant activity make them very desirable for the aquarium. These "*Epinoches*," or, as the Germans call them, *Stechbüttel*, are very abundant, and in the cold waters of the Baltic they are often caught in prodigious quantities. Schonevelde tells us that in the Gulf of Ekreford, in Holstein, "les pêcheurs en retirent quelquefois dans leurs filets de quoi remplir plusieurs tonnes, et ils en nourrissent *leurs cochons*." Better even that "leurs cochons" should eat them than that they should be altogether wasted; but if "leurs enfants," or somebody else's half-starved "enfants," could share a few "tonnes" of them with the pigs, it would be more satisfactory: they are tasty little fish when nicely cooked, as we know by experience. The ten-spined species is one of the most attractive, as well as one of the smallest of our coast fishes, but we have not been fortunate enough to take one in this neighbourhood. The whole "*Stichling*" tribe are most destructive,—"Aucun poisson fait-il plus de tort aux étangs que les Epinoches; leur voracité est excessive; Backer a vu une épinoche dévorer en cinq heures de temps 74 poissons de l'espèce de la Vandoise." The Stickleback is a nest-builder: an illustrated paper thereanent will be found in Science-Gossip, January, 1866.

The Black Sea-bream is the first marketable fish that we come across: the σπάρος is mentioned by an old Greek author. Liddell and Scott's lexicon informs us that the name was derived from σπαίρω, to gasp or pant. Whether the *Sparidæ* are particularly "thick in the wind," we do not know; we are inclined to think the term is derived from the Latin *sparus*, a dart or lance, in allusion to their sharp-spined dorsal. One of the family was common in the Mediterranean, and much prized by those right royal epicures the Romans: Ovid mentions it in the line,

"Et super auratâ *sparulus* cervice refulgens."

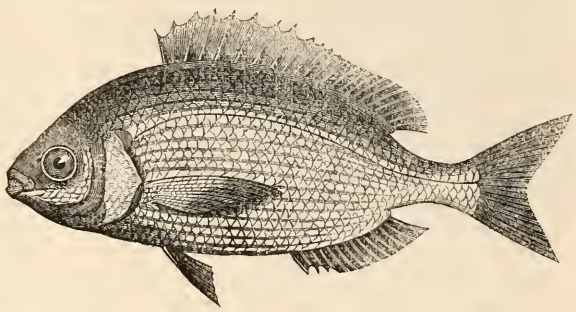


Fig. 94. The Black Sea-bream (*Cantharus griseus*). After Yarrell.

Our British name "Bream" seems to have originated in an Anglo-Norman word signifying cold or bleak. The extreme sensitiveness of the Breams to changes of temperature may furnish a clue to a fuller explanation. "The colour of this fish is blue-grey, marked with alternate dark and light longitudinal bands; from the upper and back part of the head two dark lines descend to the upper edge of the operculum, enclosing between them a space covered with scales; irides reddish orange; lips and region of the mouth pale reddish brown; dorsal fin pale brown, and lodged in a groove throughout its whole length." This groove is very remarkable; its margins are slightly rounded, and under the posterior extremity of the dorsal it forms a rounded roll. Mr. Couch has bequeathed to us a method of preparing a bream for the table, and as many a good fish is called dry, tasteless, and good for nothing, only because Britannia has not a talent for ruling her kitchen, we transcribe the receipt, in the hope of mitigating the evil:—"When thoroughly cleaned, the fish should be wiped dry, but none of the scales should be taken off. In this state it should be broiled, turning it often; and if the skin cracks, flour it a little to keep the outer case entire.

When on table, the whole skin and scales turn off without difficulty; and the muscle beneath, saturated with its own natural juices, which the outside covering has retained, will be found of good flavour."

It is not perhaps very generally known that certain fishes ruminate. What, chew the cud like a cow? somebody exclaims in amazement: even so; the pharyngeal teeth would be of little use were it not for this. "The fishes which afford the best evidence of this ruminating action are the *Cyprinoids*, Carp, Tench, Bream."

The next we take is of the family of the Wrasses, or Rock-fishes, the *Labridæ*, so called from their thick puffy lips: Latin *labrum*, a lip. This is the Ballan Wrasse, *Labrus bergylta*. The colours of this species vary considerably; the French call it *La Vieille commune*, and according to the predominating tint, distinguish it as *La Vieille rouge*, *La Vieille verte*, or *La Vieille jaune*. This, our Ballan Wrasse, has the back and greater part of the body of a dark green, the belly of a lighter colour, passing almost to white, the rays and margins of the fins, and the margins of the scales, of a fine orange-red—"leur fond vert, varié de rouge ou de jaune, leur a fait donner le nom de *Perroquet-de-mer*." It is a beautiful rich-looking fish when it first comes flashing out of the sea alive. It is sad that we cannot preserve the glowing colours of the fishes we catch; the rich red gold, the dazzling glittering silver, the bright scarlet, the emerald-green, the rose-pink, the indescribable and endless shades of blue and brown and purple, and all the refulgent sheen of the finny tribes, which fairly vie with the splendours of the summer-evening cloud stained with the dying glories of the setting sun; alas, with all our arts we cannot fix them; they all change or fade, and not a few of them vanish almost instantaneously. The very best prepared examples in our museums are but poor parched and withered mummies, and the pickled corpses put up in spirits have a fatal tendency to turn to a dull drab, with here and there perhaps a few faint traces of the gorgeous hues they bore in life. For whom is all this bravery put on? whose hearts are gladdened and whose eyes delighted by all the dazzling beauty of these fast-fleeting colours of the denizens of the deep? We know that their most brilliant war-paint is donned in the nuptial season; but can finny flirts and scaly coquettes whose pulses are quickened by the radiant hues of glowing colours, also distinguish with æsthetic appreciation the exquisite refinement of shade, the delicate *nuances* of tone and tint, and all the ever-changing splendours of the hues of Iris? How much hidden, and as it were wasted beauty, is there in this wondrous world of ours: for whose eyes do the waxen petals of the night-flowering plants unfold on the lone storm-beaten peaks of the wild Rocky Mountains? Do they charm the eye or speak to the heart of the Grizzly bear and the Solitary wolf; and do the Coyoté, the Owl, and the Rattlesnake rejoice over the gold and silver stars and cups and bells of the wild flowers of the prairie? Surely these beauties are not thrown away; there is no waste in Nature's house: take even the common grasses of the fields, and the microscope will show us that they bear fairy flowers of pearl and crystal, powdered and spangled with dainty gems Queen Mab herself might covet; and that their forms (invisible to the unassisted eye) are not surpassed in loveliness by the superb Magnolia or the queen of the water-lilies. Whose minds have been purified, whose souls lifted up by the contemplation of these fairest of earth's offspring through all the myriad ages that have flown? Were they created merely in anticipation of the lenses of the optician; and if nothing more than "essential organs," or lures to attract the *Hymenoptera*, by sight or smell, to visit them and insure the transfer of the pollen, then why so marvellously lovely?

But, revenons à nos poissons. The ingenious jewellers of Venice utilized the metallic lustres of the fish, and from the inner lining of the scales of the "Bleak," *Cyprinus alburnus*, a freshwater member of the Carp tribe, they manufactured imitation pearls with great success: we believe the glittering pigment of the under side of the mackerel is still used for the same purpose in Paris, and perhaps in London.

Can we not devise some method of preserving the colours? At p. 161 of SCIENCE-GOSSIP for 1867, a tribute of admiration is paid to the preserved fishes shown by Captain Mitchell at the Paris Exhibition. How did he preserve them? It will be a pity if a good process remains a secret.

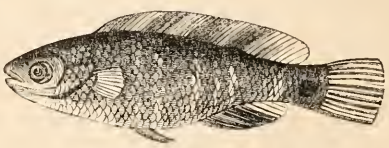


Fig. 95. The Corkwing Wrasse, ½ nat. size.

Here is another Wrasse, comparatively rare,—the Corkwing, a gorgeous little fellow, wearing much the same colours as the Ballan, but banded across the back, and maculated as to the fins with royal purple, and stamped with a characteristic round spot on the lateral line close to the caudal fin; a charming little stranger for the tank. Ah me, these other two, his brethren, we must bottle off in spirit, and they will turn to nobody knows what colour in five minutes.

Next comes a "Whiting Pout," *Morrhua lusca*, "the Bib," "Pout," or "Whiting Pout:" it is one of the extensive and most valuable Cod family, *Gadidæ*, which includes the common Cod, the Haddock, the Whiting, the Pollack, the Hake, and the Ling, all most important food-fishes; besides others of less note.

We have hauled in at least a couple of hundred of young Pout no bigger than minnows, and every one of them has died of suffocation, from being dragged through the water and smothered up in the great bundle of weed and rubbish collected by the Trawl; we find them dead on shaking out the cob. Here are a lot of young *Clupeidæ* too (the Herring tribe), all dead and done for: what would these have been worth had they escaped the fatally fine meshes of the murderous prawn-trawl, and lived on to maturity? The young of the Pout, the Herring, and the Whiting die on the slightest provocation; the young Pout, especially, rarely reaches the surface alive.

We have a "Five-bearded Rockling," *Motella quinquecirrata*, one of the *Gadidæ;* a good eatable fish about a foot long: sometimes we may find one amongst the stones at low water. Here is another of the same great family, "the Coal-fish," *Merlangus carbonarius*, one of the most voracious of the class; whence the Cornishmen have named it the Rauning (*i.e.* ravening) Pollack: it grows to a large size, even to thirty pounds, and is caught in immense quantities; although somewhat coarse, it must be considered an important member of the group, on account of the bulk of meat it supplies.

And now let us look at these flapping "Flounders," more commonly called Flat-fish,—*Pleuronectidæ* (πλευρὰ, side; νήκτης, fin) as they are improperly named, the fins in question being in reality the vertical fins,—viz., the "dorsal" and "anal." These animals being destined to live at the bottom of the sea, present a very remarkable adaptation of structure. "To an ordinary observer the *Pleuronectidæ* would seem to have their bodies flattened and spread out horizontally, so that while resting upon their broad and expanded bellies, their eyes, situated upon the back of the head, are thus disposed for the purpose of watching what passes in the water above them; and this, the vulgarly-received opinion, is considerably strengthened by the fact that what is usually called the belly is white and colourless, while the back is darkly coloured, and sometimes even richly variegated." "The great peculiarity of their structure is the want of symmetry between the lateral halves of the body, arising from the anomalous circumstance that both the eyes are placed upon the same side of the head. Their cranium, indeed, is composed of the same bones as that of an ordinary fish, but the two lateral halves are not equally developed; and the result is such a distortion of the whole framework of the face, that both the orbits are transferred to the same side of the mesial line of the back." Some of them have the eyes and the coloured scales on the right side; these—viz., the Plaice, the Flounder, the several kinds of Dab, the Fluke, the several kinds of Sole, and the mighty Holibut—are called Dextral fishes; while the Turbot, the Brill, the Topknots, the Whiff, and the Scaldfish, being coloured, and having the eyes on the left side, are called Sinistral. All the fishes of this class are exceedingly tenacious of life.

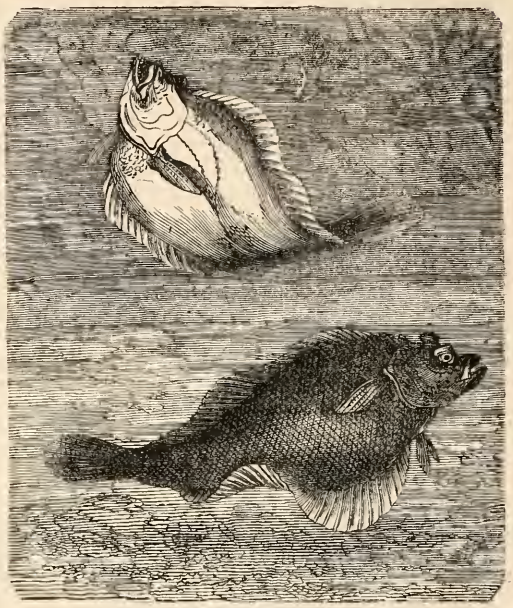


Fig. 96. The Dab (*Platessa limanda*).

We are indebted to Messrs. Cassell, Petter, and Galpin for this illustration of the Dab, as well as for fig. 88: they are taken from "The Ocean World," a work abounding in spirited life-like sketches, which we commend to lovers of Marine zoology.

First we find we have taken a Plaice, *Platessa vulgaris:* it is readily distinguished from its congeners by the large bright orange-red spots dispersed all over the body: when young, there is often a dark spot in the centre of the orange one. The scales are small and smooth, and the right side is of a rich brown. Next we find the Common Dab, *Platessa limanda:* it is remarkable for the roughness of its scales; hence it is sometimes called the Rough Dab: its specific name (*limanda*) is derived from the Latin *lima*, a file: the colour of the right side is a uniform pale brown. We have yet another, the Lemon Dab, *Platessa microcephala*, with smooth scales and a light yellowish-brown side, with darker brown specks; the lips and edges of the operculum are yellow. Here is a Sole, *Solea vulgaris*, the most delicately-rich and firm-fleshed of all the flat fishes: examples have been known to weigh nine pounds. Specimens called "Reversed Soles" (*i.e.* sinistral, instead of dextral) are not uncommon; the coloured side is of a greenish-brown, the lateral line straight; the right eye almost touches the angle of the mouth. There are

"Lemon Soles" on the Sussex coast almost as yellow as the fruit; they are taken off Emsworth, and fetch a fancy price. We have yet another Sole, *Solea variegata* (the "Variegated Sole"), sometimes called the Thickback, Bastard, and Redback; it is much smaller than the others, and of a reddish-brown, mottled with black patches. All these varieties of flat-fish that we have caught are chiefly taken with the Trawl, and the number sold in our markets is almost beyond belief. "Mr. Mayhew, in some of his investigations, found out that upwards of 33,000,000 of Plaice were annually required to aid the London commissariat. But that is nothing. Three times that quantity of Soles are needed—one would fancy this to be a statistic of shoe-leather,—the exact figure given by Mr. Mayhew is 97,520,000. This is not in the least exaggerated. I discussed these figures with a Billingsgate salesman a few months ago, and he thinks them quite within the mark."—("Harvest of the Sea," page 208.) In these our present operations we have hauled in at every cast at least a score of young flat-fish, varying from the size of a shilling to three inches in length, for every eatable (we don't say saleable) fish of the same genus. We may say the same in the case of all other kinds, and may even multiply the number of fry by ten in some cases. There are people who maintain that the Trawl is a most harmless instrument, and the removal of the slender restrictions now placed upon its use has even found advocates in high places; we declare the small-meshed trawls, and especially the prawn-trawls, which suffer nothing to escape, to be most ruinous and murderous engines of destruction: not only do they cause the death of millions-of-millions of young fish of the most valuable kinds, but they tear up and destroy the weed and cultch amongst which they shelter and on which they feed; they spoil the feeding-beds. The fishermen, especially the old men who have retired, admit privately that "the beds all about here have been scraped as bare as the back of your hand," and will tell of the bushels of fry killed in every night's work. "I wonder that there's any fish left at all," said an old Sea-Bear the other day; but of this more anon; we have not space just at present.

We have a "Sharp-nosed Eel," *Anguilla acutirostris*. The habits of this creature and of eels in general, their strange migrations, their overland journeys, their marvellous instinct for finding their way from inland freshwater stews to the salt sea, are most interesting; but we cannot pause to consider them.

We have taken two species of *Syngnathi*,—viz., *S. Acus*, the "Great Pipe-fish," and *S. ophidion*, the "Straight-nosed Pipe-fish." These and others have been depicted in a former paper (p. 202, Sept., 1870). We have seen that the Carp chews the cud like an ox; but here we have a fish that carries its young in a pouch like an Opossum or a Kangaroo. The lady *Acus* extrudes two strings of eggs: in the specimen before us there are thirty-two in each string. The gentleman *Acus* is provided with two broad flaps (the left overlapping the right), which run along the whole length of the underside of his tail; he carefully receives the eggs from his lady love, and places them in parallel rows beneath his apron-flaps, and not only carries them until they are hatched, but dutifully nurses the little ones after they are born. We commend the Great Pipe-fish to the consideration of the "Women's Rights Association," and if that Amazonian phalanx have not yet decided upon the device to be emblazoned on their shields and banners, we venture to suggest, two *Syngnathi* entwined, as a suitable and highly expressive emblem.

Twenty-three varieties of fishes have been taken in our net, not all in one cast, as, for the sake of brevity, we have made it appear, but in ten or twelve casts, occupying, together with the shifting of ground, about fourteen hours,—viz., from twelve o'clock noon until two hours after midnight, spent on many banks and beds between the Warner Shoal and the Mother Bank. We now pass on to the *Crustacea* taken during the same cruise. The smaller genera of these are found to be strangely local, varying with every bed, leading us to conclude that they are not much given to travelling. First we notice a fine Lobster, the common edible lobster, *Homarus vulgaris;* and next, a "Scaly Galathea," *Galathea squamifera.*



Fig. 97. The Scaly Galathea (*Galathea squamifera*).

At first sight one would put the Galathea down as nearer a lobster than a crab; but it is a true

crab, one of the *Porcellanadæ*, or Porcelain-crab family, and of the class *Decapoda anomoura* (*vide* SCIENCE-GOSSIP, April, 1869, p. 74). The colour of this Galathea is a greenish brown tinged with red: there is a splendid species, *G. strigosa*, the "Spiny Galathea," of a brilliant vermilion colour, the integument between the shell-plates being of a deep cobalt-blue; it inhabits deep water, but we once took one off Bembridge Ledge. The "Spiny Lobster," *Palinurus vulgaris*, is sold hereabouts under the name of the Crawfish; it has no "pinchers," and boils of a dull dirty red tinged with brown: the real Crayfish, *Astacus fluviatilis*, belongs to a different family altogether, and is armed with powerful claws.

Of the veritable short-tailed crustaceans we have got "the Slender Spider-crab," *Stenorhynchus tenuirostris*; "the Long-legged ditto," *S. Phalangium*; another crab, *Pisa*; the "Harbour Crab," *Carcinus mænas*; the "Arched-fronted Swimming-crab," *Portunus arcuatus*; the "Cleanser ditto," *P. Depurator*, who has no special claim to this epithet (all crabs are scavengers); and the old familiar "Hermit Crab," *Pagurus Bernhardus*. Nearly all of these have been either figured or described in the past numbers of SCIENCE-GOSSIP, and it is needless to dilate upon them here; but here are two strangers, not by any means common, and we have got both the male and female alive in one and the same haul: *Corystes Cassivelaunus*, the "Masked Crab," the first pair it has ever been our lot to capture.

This genus is sometimes called "the Long-armed Crab," a term that can only be correctly applied to the male: it is of a pinky cream-colour and burrows in the sand, leaving only the tips of its long setigerous antennæ visible. We are indebted to Mr. Gosse for the discovery of the special functions performed by these organs. "I have observed that, when these crabs are kept in an aquarium, they are fond of sitting bolt upright, the antennæ placed close together, and also pointing straight upward from the head. This is, doubtless, the attitude in which the animal sits in its burrow, for the tips of the antennæ may often be seen just projecting from the

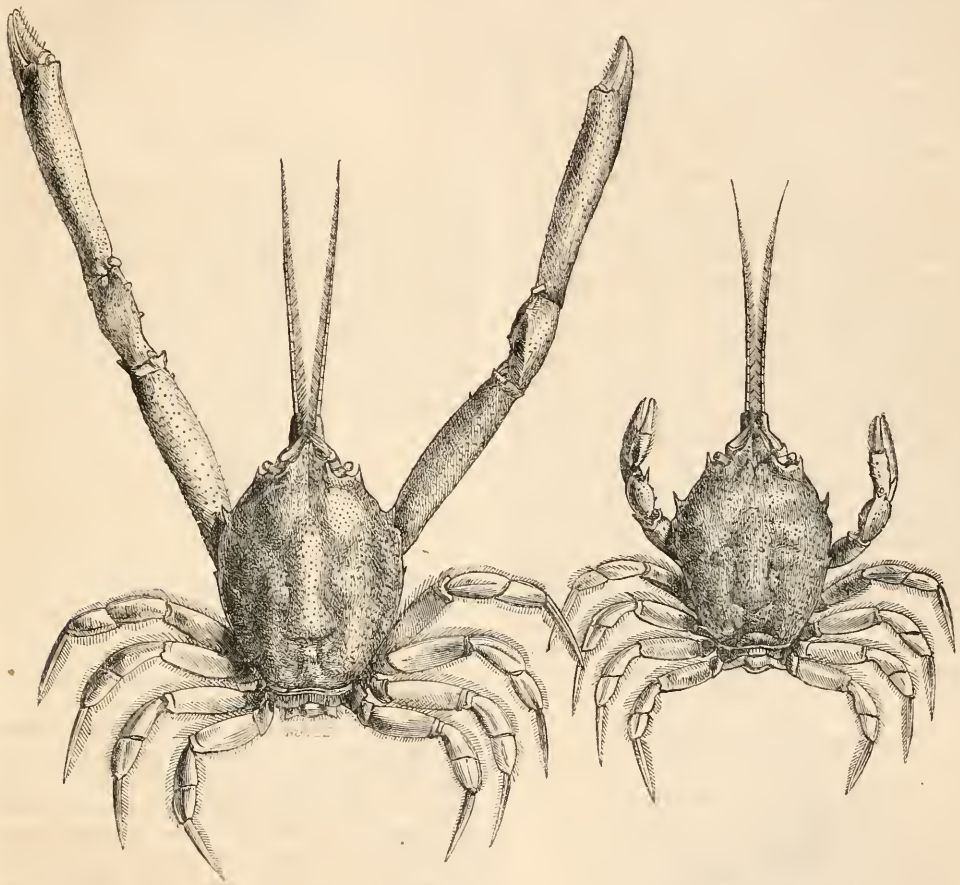


Fig. 98. The Male. The Masked Crab (*Corystes Cassivelaunus*). Fig. 99. The Female.
Drawn from Nature, life size.

sand. When the chosen seat has happened to be so close to the glass side of the tank as to bring the antennæ within the range of a pocket lens, I have minutely investigated these organs, without disturbing the old warrior in his meditation. I immediately saw, on each occasion, that a strong current of water was continuously pouring up from the points of the approximate antennæ. Tracing this to its origin, it became evident that it was produced by the rapid vibration of the foot-jaws, drawing in the surrounding water, and pouring it off upwards *between the united antennæ*, as through a long tube. Then on examining these organs, I perceived that the form and arrangement of their bristles did indeed constitute each antenna a semi-tube, so that when the pair were brought face to face the tube was complete." "I think then that we may, with an approach to certainty, conclude that the long antennæ are intended to keep a passage open through the sand, from the bottom of the burrow to the superincumbent water, for the purpose of pouring off the waste water, rendered effete by having bathed the gills."

Of the smaller crustaceans we have caught enough to fill several buckets. "Oh! what a lot of prawns!" cries one of the party, when the light of the lantern, just after midnight, falls upon the produce of "a long leg" over the Horse.—"Pra—ans," replies a weary mariner peevishly; "them baint pra—ans, its them cussèd Night-walkers, *they* is." "*Night-walkers* do you call them?" exclaims an excited naturalist, interrogatively: "Oh! oh! they swarm at night do they? then that is why certain feather-bed philosophers declare that *Nika edulis* is rare; the lazy rascals, let them come and work out here *sub Jove frigido*, in the small hours of the morning, and they won't say they are scarce."

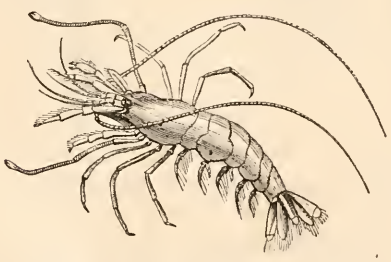


Fig. 100. The Night-walker (*Nika edulis*).

The Night-walker is singularly translucent if not transparent; the females we have caught are laden with ova of a most delicate pale grass-green. We have had one for months in the aquarium—a lively, active, restless thing; she deposited eggs by hundreds, much to the satisfaction of her hungry fellow *détenus*, who ate them all.

Close inshore under the Browndown battery, where the bottom is said by the first mate to be "pertickler grassy," we get all at once and all together a great quantity of brilliant and striking shrimplike things which we have not found anywhere else. We have two varieties with "kinks" in their saddled backs; the one is a glossy crimson-lake, the other a shining green, precisely matching the hues of certain seaweeds. Widely divergent as the colours of the two creatures are, they are specifically the same. We have plenty of the common shrimps, *Crangon vulgaris*, and, mixed up with the Hippolytes, a vast quantity of the pretty "Banded Shrimp," *Crangon fasciatus*.

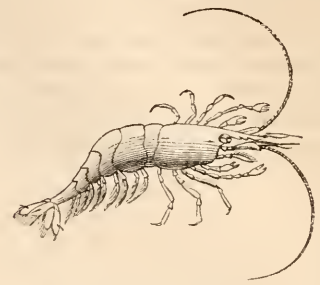


Fig. 101. *Hippolyte varians*.



Fig. 102. The Banded Shrimp (*Crangon fasciatus*).

We have true Prawns, *Palæmon serratus*, both old and young, in all stages of growth; some so large that they seem to be attempting to swell themselves out into lobsters, and others in their early babyhood. Now let us see, we have about three gallons of edible or rather of saleable or fashionable crustaceans, *i.e.* of the Prawn and Shrimp kinds; the others are equally good, but not yet in vogue. Of the marketable sorts there are many degrees: first of all the cabin-boy, who would have developed into a powder-monkey in Nelson's time, but who in this day of great names, when the shopboy is "a commercial assistant," and the lawyer's clerk "a gentleman connected with the eminent legal firm of, &c. &c.," there are no powder-monkeys; they are "magazine-men," if you please;—well, the young sea-whelp picks out the most ambitious prawns, about 150 all told,—these will sell at the rate of 25 a shilling, and nobody but the Chief mate (who also constitutes the Starboard-watch) can be trusted to boil them; they

must be boiled in the boat, to be first-rate, and not only to be first-rate, but to be saleable. "When they dies natural, they dies with their tails out straight, and they don't look sa purty, and folks wunna buy 'em; but if we biles 'em afore they be dead, they tucks their tails in tidy underneath 'em." The smoky little stove under the forecastle is set fuming, and the select *Palæmonidæ* are put into a saucepan with seawater and boiled for fifteen minutes, when they are turned out into a wicker basket, which acts as a strainer and lets the hot water run off, and then the Starboard-watch rushes to the gunwale and dashes the hot smoking prawns, basket and all, into the sea alongside, sousing them half a dozen times or so in the cold waters. "It makes 'em crisp," he says, and they certainly put on a much more roscate hue than they wore before; then, all glowing, pink, and crisp, and shining, they are laid out in another basket, and intermixed with a surprising quantity of coarse kitchen salt, a good handful to about fifty, and they are ready for sale after about three hours; without the salt, they would be watery and tasteless. The Starboard-watch takes the helm; the Second-mate, who is the Port-watch, proceeds to operate in a similar manner upon some 300 middle-sized prawns and large shrimps (the latter in boiling become curiously mottled with opaque white, recovering their natural or rather final colour when plunged in the cold bath), worth about a shilling per 100, and when he emerges, the prospective powder-*man* treats a couple of gallons of smaller samples in the same fashion; these, irrespective of genus or species, are designated "cup-shrimps," and will be sold at a halfpenny the half-pint cup in the small bye-streets and courts. We have *Mysis vulgaris*, and our old friend *Gammarus locusta* (*vide* September, 1869, p. 197).

Of the family *Idotæa*, we have *Stenosoma lineare* (*vide* Sept., 1870, p. 198) and a shorter and thicker species, *Idotæa tricuspidata;* but here, under the carapace of a prawn, causing one of those bulging swellings we so often see in both prawns and shrimps, is another of the *Isopod* tribe; not a bit like *Stenosoma* you will say; but, nevertheless, a true *Idotæa*, called *Bopyrus*.

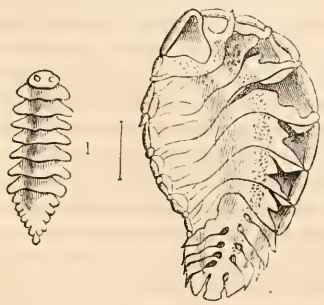


Fig. 103. *Bopyrus crangorum*, × 10. Male and female.

These creatures fasten on under the gill-covers of prawns and shrimps. As they are often found with their backs to the assailable portions of their hosts, it has been thought that they may only use their retreat as a dwelling-place, feeding themselves upon the animalculæ contained in the water passing over the branchiæ of their landlords; but we strongly suspect that they take more than house-room from their entertainers.

Of the Mollusca, we have bagged *Sepia officinalis*, *Sepiola Atlantica*, and *Loligo media*. There are so many illustrated papers in previous numbers upon Cuttlefish, that we need not speak of them again. We have got *Philine aperta*, one of the slug-like *Bulladæ;* one solitary Top, *Trochus cinereus;* and one tiny littoral shell, *Rissoa labiosa:* the lingual strap of the latter is very fine.

Now take off your hats, and behold in reverent silence the unchanged descendants of the first vertebrate progenitors of the human race: these are old-fashioned fellows, who have not departed from the customs of their forefathers; ages ago some wild adventurous speculators developed themselves desperately, and their progeny are now kings and bishops and judges, and no one knows what; but these are the offspring of the steady-going old "Square-toes," who clung to the good old ways of the good old times; they hated selection, and eschewed development; this is the reason why they are still only *Ascidians*, and instead of "saving" France or "unificating" Germany, they are being dragged up by the trawl and put into a pickle-bottle.

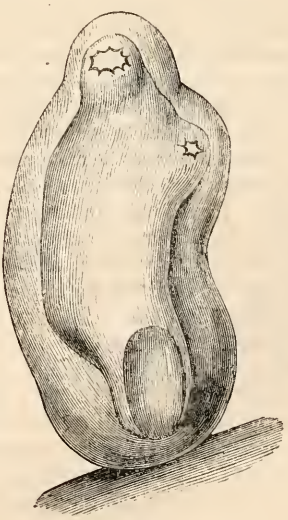


Fig. 104. *Ascidia mentula.*

We have three—nay four varieties, *Ascidia mentula*, *A. aspersa*, *A. virginea*, besides a *Cynthia*.

Last of all, we pick up a green sea-anemone with

rosy-tipped tentacles, *Anthea cereus;* and that ends the list. Let us reckon up the number of the various classes, genera, and species of aquatic creatures we have secured. Of Fishes, 23; of Crustacea (including the Isopoda), 19; of Mollusca, 6; of Molluscoida, 4; of Actinia, 1: grand total, 53. What a collection!

We could not attempt to catalogue the endless annelids great and small, the polyzoa and hydrozoa, and all manner of zoa found amongst the weed, which have added a dozen new slides at least to the microscopic cabinet in the Haslar Museum: we have an idea that sundry starfishes, oysters, mussels, whelks, &c., ought to have figured in our list; which, with the exception of these omissions, is a *bonâ fide* list of the spoils we sorted out after a trip, and not a spurious concatenation of things (that it might be possible to catch) compiled from a Cyclopædia.

The time, labour, and expense of these little expeditions are too often thrown away for want of a little common care and foresight; the young naturalist is apt to trust to the boatman "to find something to put the things in," and "the things" get put into the fisherman's bucket, and if the latter is not capsized by a lurch, it gets put in the hot sun: the little fishes in their struggles get stuck into the gasping throats and gills of the big fishes, who are stifled and poisoned with heat and overcrowding. If these catastrophes are avoided, the mate or the boy is promised an extra sixpence "to carry them up to the house"; and as the smack has to be moored, and all the gear made safe and snug, a long time elapses before the toil-earned specimens arrive, when probably all that have not been lost by the slopping-over of the bucket *en route*, have been effectually suffocated by the shaking and jolting, and many are not only dead, but torn and mashed and spoiled; if any have survived, the chances are there is no clean cool sea-water to put them into, and they soon go the way of the rest; next morning they offend somebody's olfactories, nobody knows how to preserve them; and like the proverbial salt that hath lost its savour, they are cast upon the dunghill. "Tabby Tom" from next-door, soon "winds" them, and scrambling over the wall, commits suicide by filling his belly with the sharp spines of the *Acanthopterygii*, or the still more fatal spines of a starfish: there is a terrible caterwauling over his mortal remains, first by the tight-laced Spinsters, his Mistresses, who bring a charge of arsenic and malice prepense; and secondly, by his feline mistresses, whose unearthly screams and wailings on the tiles make midnight horrible.

If a thing is worth doing at all, it is worth doing well, and a little prevision and provision are necessary to secure success. Before we set out, we take care to have two or three large clean glazed earthen footpans and flat shallow milkpans well scalded out, and then filled with clean sea-water; and we take with us, besides the bottles and jars for little things, two or more big unpainted iron garden watering-pots, also carefully scalded out, and an old rug to spread above them tent-fashion when the sun is up; we take care to put them in a safe place in the boat, and lash them so that they can't be upset; before the first haul we half fill them from alongside, and from time to time we add water, and if we are out long, we now and then pour off part of the old and effete fluid, and fill up again afresh: these cans are easily carried by a man with a milkman's yoke, or they will ride in a cab, and do not in either case slop over. On our return home the living things are at once lifted out with a net into the cool clean water in the open airy pans, there to await our final disposal. Creatures that are to be removed ultimately to the permanent aquarium require to be gradually acclimatized; they are apt to go wrong if plunged at once into a long-established colony. Throw away the water that has come home in the cans; its oxygen has been exhausted; it is all hot and muddled, and foul with the vomitings of the crowded prisoners; it would poison Beelzebub; throw it away.

Fishes that have to be preserved in a rough-and-ready way for future reference and examination, may be put just as they are, into a confectioner's show-glass filled with common methylated spirit; in about a week the mucus and other impurities will have settled to the bottom in flocculent masses, the super-natant spirit will be as clear as water: then lift each one carefully out and wipe it gently over with a soft sponge moistened with spirits of ammonia, which will completely free it from slime and brighten it up; then place it in fresh methylated spirit, either in a show-glass or in a proper "specimen glass" with a ground-glass stopper. The fewer that are put into the same jar the better; but we have thirty fishes and an infinity of crustaceans in one single jar, in which they have remained without deterioration for three years.

Those who wish to make a study of our Fishes, will do well to procure Yarrell's "British Fishes"; Couch's "Fishes of the British Islands"; Cuvier and Valenciennc's "Histoire Naturelle des Poissons," and to hunt out the papers by Dr. Günther and others in "Ann. Mag. Nat. Hist." Bertram's "Harvest of the Sea" is an interesting book; and to unpretending people, who are not ashamed to be seen referring to a handbook when out on a seaside holiday, we strongly recommend Mr. Gosse's "Manual of Marine Zoology." With it in their pockets they can scarcely fail to identify any living thing they can possibly catch on our coasts, with the Dredge, the Towing-net, or the Trawl.

Bury Cross, Gosport.

THE BULLFINCH.

AS "J. R. S. C." does not seem acquainted with the Bullfinch in an aviary, perhaps a few words may be interesting.

The Bullfinch kept in a cage is very different to that kept in an aviary. He seems very solitary, sitting on the perch with an air of indifference that almost amounts to moping, and if the monotony is broken by his song, it is so poor that it is scarcely worth mentioning; indeed, the hen sings equally as well as the cock.

Yet in a cage he will become remarkably tame, especially if you can find the food he likes best, taking care that he takes nearly all of that particular food from the hand: he will then soon answer to a name, if the name be made use of at the time of feeding.

Last season my son brought up a nest of bullfinches, with an idea of teaching them the "Blue Bells of Scotland;" but as they did not turn out good scholars, they were let fly in the aviary, and at any time the tune was played, they would assemble and get as close to the performer as possible.

The wild song of the Bullfinch is low and jarring, but it has also about two low piping notes. Although such a poor songster, it has an odd yet fascinating manner when singing, moving its head from right to left.

The English Bullfinch is a better speculation than the German bird; indeed, all birds from Germany are very delicate, and rarely live long in this country.

If you wish your bird to pipe a tune, you must have him from the nest. In Germany the bird is brought up from the nest and kept principally in the dark while being taught by a bird-organ; but after all this training many birds will not pipe worth anything.

Without any trouble the Bullfinch is an interesting pet, and may be seen to perfection in an aviary. So different to the bird kept in a cage, so attentive to his hen, displaying much sprightliness in flying about, taking his bath, and singing as best he can, calling the hen to nest, and also helping her to build; now in the nest uttering that peculiar call "pheew, pheew." How many times when a boy have I followed the sound, thinking it proceeded from young birds being fed or in distress.

Last autumn I placed a pair of these birds in my aviary, where all kinds of birds are kept, and instead of interfering with their neighbours, it is just the reverse. Some few days ago they partly built a nest, but the Hawfinch thought proper to make a roosting-place of it, so the Bullfinch had to give it up: they are busy now searching for another place; indeed, I think if the hen could find a nest ready-made she would like it; for, upon a canary leaving her nest, that is situated not far from that which was half built by the Bullfinch, she took up her quarters in the Canary's nest, and was making herself comfortable, when the Canary returned, and of course beat her out. The Hawfinch being removed, they have now finished their nest; so in a few days I expect to find eggs.

An aviary is not complete without the Bullfinch, where he seems as happy as though he were in the woods: he will be found to live upon good terms with his feathered companions, from the Siskin to the Hawfinch, and a hybrid bullfinch is sometimes seen.

I have often heard of the colour of this bird being changed by feeding upon hemp-seed, but think it must not be accepted as the rule, but rather the exception.

The Bullfinch does not congregate in flocks, as the Goldfinch, Chaffinch, &c.; consequently they are caught at all seasons of the year by birdlime twigs: those taken at the fall of the year are most likely to live. His meat should be rape and canary, with hemp-seed about twice a week. Should he fall sick, he should have maw-seed, hard-boiled egg chopped fine, also sopped bread and milk: to keep your bird in health, he should be bountifully supplied with gravel and water, also green meat.

CHAS. J. W. RUDD.

YELLOW ANT.

(*Formica flava.*)

THIS ant (that is the neuter or worker) is in size scarcely bigger than the well-known black ant. Its localities are on the turf and hedge-banks on the borders of roads. It swarms in September; respecting which I find the following note in my diary under September 15th, 1870:—To-day, after a long ramble, and feeling somewhat fatigued, I lay down on the grass by the side of the H—— road. I had not lain long before I noticed that the grass stems for yards around were covered with glittering moving particles. Looking more closely, I found them to be an immense number of the large winged females of the yellow ant preparing to migrate, and that the glittering appearance proceeded from their wings, of which each ant has four. These females were very much larger than the neuters, and of a darker colour, but yellowish below. On searching around, I found several nests of these ants, or at least holes through which the insects issued in great numbers. The light-coloured neuters were clustered round these holes, and as each of the gorgeously-apparelled females made her appearance from the hole, she was surrounded by the neuters, who stroked and caressed her with their antennæ just as we see a fond mother giving the finishing brushings, arrangings, and congratulations to her child when setting out for school. The insect, after passing through this ordeal, mounted on the top of a blade of grass

to try its wings. In the midst of another cluster of neuters, I noticed a small number of winged ants much inferior in size to the other winged ones, and of a darker colour; these I inferred to be the males. The greater number of the winged ants had departed by five p.m. It was, I must confess, a very interesting sight. The only drawback to this scene of good order was the presence of a small band of the ferocious red ants, which were stationed in a dense thicket of grass-blades close by; and when an opportunity offered, rushed out and caught a straggling yellow neuter, and most unceremoniously dragged it off by its antennæ. One of the yellow ants on being seized thus by the red cannibal, endeavoured to escape, when the latter again seized it and gave it several vicious digs with its powerful jaws. *Query*—Were these captive yellow ants devoured by the reds, or were they made the slaves of the latter? WILLIAM HENRY WARNER.

Kingston, Abingdon.

ZOOLOGY.

ENTOZOA IN THE HEART OF DOGS.—Can you tell me if anything is known of an entozoon, to all appearance a strongylus, which has its habitat in the hearts of dogs? It is said to be a common cause of death of these animals out here, and I have had one specimen in which the cavities, both auricles and ventricles, contained dozens of long worms, several of them six or eight inches in length, and to all appearance living bathed in the current of blood. There are no books of reference out here except my own small travelling library; but if the matter is not much known and promises to be interesting, I will endeavour to get more information about it and send it to you. A few words to "H. A." in your correspondents page will probably be sufficient.—*Henry Hadlow, Surgeon R.E., Yokohama, Japan.*

[It has for a long time been known that nematode parasites infest the heart and blood-vessels of carnivora, and especially of dogs; the large species found in Chinese dogs being the so-called *Spiroptera sanguinolenta*. At the last meeting of the British Association, held at Liverpool, the subject was discussed by Dr. Cobbold, who exhibited specimens forwarded to him by Mr. Robert Swinhoe, H.B.M. Consul at Amoy. Specimens have also been brought over to this country by Dr. Jones Lamprey; another series being in the possession of Dr. Bennett, of Edinburgh. Remarks on this parasite will be found in the Supplement to Dr. Cobbold's work on Entozoa, in the ninth volume of the "Linnean Society's Proceedings," and in the forthcoming Report of the British Association for 1870. The distinguished helminthologist Dr. Metznikoff having expressed the opinion that the larvæ of certain ascarides may be found in external parasites, we would suggest to our correspondent the propriety of microscopically examining the bodies of the fleas which may be found on the coats of Japanese dogs. It is supposed that when dogs are worried by their external parasites they seize and swallow many of these fleas, and by thus transferring their external enemies to the interior of their stomachs, the nematode embryos resident in the fleas are liberated by the action of the gastric juice. If this be so, to destroy your outer enemy is to create your inner one. The subject is exceedingly curious, and well deserving of Mr. Hadlow's special investigation.]

LARVA OF THE COCKCHAFER (*Melolontha vulgaris*).—Dr. Moses seeks for information about this troublesome beetle. I may state, in brief, that the eggs are, as might be supposed, deposited during the summer, and hatch in about a month. During the remainder of that year, the larvæ do not increase much in size, and keep together in small colonies. Though they descend farther into the ground when winter sets in, it is probable that they do not hybernate. There is no doubt that the larval state always lasts three years; thus for instance, a larva hatched this summer would be adult in the autumn of 1873. According to some who have investigated its economy, the larval condition is occasionally prolonged through another year. Fignier asserts that it is only during the second year that they commence their attacks upon the roots of plants, feeding at first upon decaying vegetable matter and dung. In the last year of their growth, the cockchafer larvæ will sometimes attack the roots of trees; but to these they appear to be less partial, preferring those of herbaceous plants. While this long larval life lasts, they pass through many ecdyses, or changes of skin. One of the most singular facts in its history is this; though the beetle emerges from the pupa in the autumn (that condition being brief in its duration), it remains in the ground until spring, working its way up by degrees. Hence sharp frosts in March and April will destroy many of them. It is a matter of very general observation that there are what are termed "cockchafer years," when the species is particularly abundant. These happen triennially, as a rule, which is to be explained by the history of the species.—*J. R. S. C.*

HAWFINCH (*Coccothraustes vulgaris*).—Your correspondent Mr. Anderson is wrong in supposing this bird to be so rare as he states in the last number of the GOSSIP. It breeds rather freely in Herefordshire, and in some parts of Middlesex, and a season never passes without nests being found there. At least a dozen have occurred this spring to my knowledge. As I am desirous of ascertaining its distribution in other parts of the country, I would invite correspondents to record its occurrence when such has come within their own observation.—*C. A.*

The Elephant Parasite.—I was much interested by seeing, in the June issue of the Gossip, the description by a correspondent of a rare and new species of parasite from the elephant. Rare it certainly is, but not altogether new, inasmuch as I have in my possession some six or eight specimens, which my late father procured some months ago, and intended describing in his 2nd vol. on Anopluræ, but was prevented by his sudden death. This parasite was considered by him to be an entirely new one, and to take, as far as his examination of it had gone, a somewhat intermediate position between the Pediculidæ and the Cimicidæ; but unfortunately he had not completed his examination and description of it when seized with his last illness, and so had to leave this, along with others, undescribed, and also the manuscript of his 2nd vol. incomplete. I shall endeavour, however, to secure to the entomological world, and to the lovers of this unpopular class of insects in particular, the unpublished result of my father's labours for the last twenty years. The parasites in my possession were kindly procured for my father by Mr. Maunders, from an elephant in his travelling collection.—*T. G. Denny, Burley Street, Leeds.*

Processionary Moths.—I have only just discovered in your May number (having been from home) an account of the Processionary Moth. I beg to inform you that these caterpillars have made periodical visits to my garden for the last dozen or fourteen years. The first year they appeared, we caused our servant to catch them; and, being all of us ignorant of their urticating nature, the boy suffered as your correspondent describes. Since that time we have destroyed many, but have taken care never to touch them. I have *heard* of clothes dried near the trees on which the caterpillars were, becoming poisonous. The Processionaries are very numerous this year, though I have never had the luck to see a procession. With us they devour oak, elm, hornbeam, wild cherry, and even *laurel!* —*Julia Colson, Swanage, Dorset.*

Cat-ology.—A very few instances of "incongruous attachments" have been recorded respecting the cat, which in its wild state is one of the most cruel and bloodthirsty of the ferocious genus of Felis, and even the "tabby" of our venerable maiden aunt, with all its innocent purring, is a heartless, sanguinary beast (I speak feelingly, one having this week decimated a valuable brood of our chickens!) Never, however, till the other day did I hear of a cat acting as a retriever. A gentleman, a day or two since, told me the following circumstance, almost incredible, and which I should not have risked my credibility by recording had not the Rev. G. White, in that interesting little work, the "Natural History of Selborne," mentioned something similar, and as unusual. The wife of my friend has a fine "tortoiseshell," which not only lies at her feet by the fire, but follows her like a dog. In the dining-room hangs a canary, which is frequently allowed the liberty of flying about the room. On the occasion referred to, the window being open, it made its escape, and flew into the neighbouring garden. The lady, followed by her favourite puss, went in search of the bird, and vainly tried to catch or induce it to return the way it went, viz., through the open window. Puss soon comprehended the situation, and crouching and creeping cautiously, feline like, made a spring and caught it (nothing surprising so far). Instead, however, of putting poor dicky into its maw, she brought it indoors, and placed it in the hands of her mistress, who was as much astonished as delighted to find scarcely a feather injured! I may just add that the before-mentioned cat on the occasion of the death of a hen, had actually "nestled" a small brood of chickens.—*C. Harvey Betts, M.D., Gatten House, Shanklin.*

More New Parasites.—In the July number of the *Monthly Microscopical Journal*, there are two parasites described by Mr. T. G. Ponton, F.Z.S., as new species. One of these is referred to the sub-genus *Docophorus*, the other to the genus *Trichodectes*. Having been collecting and studying these insects for some years, I am naturally interested in new facts connected with my favourite entomological corner. I trust I may therefore stand excused in suggesting the expediency of some further information about these extraordinary species. A *Docophorus* with *single*, and a *Trichodectes* with *double* tarsal claws, are things quite new to me, and were certainly altogether unknown to the late Mr. Denny.—*H. C. Richter, Kensington.*

Nidification. — Two circumstances regarding the nidification of birds came last month to my knowledge, which seem to me rather exceptional, and which, I think, might interest some of your readers. One was that of a pair of moor-hens (*Gallinula chloropus*), which had chosen a pond, on a farm at Sproroston, near the high road, and close to the farm buildings, between three and four miles from any river or marsh. There, on an old fagot placed to prevent the cattle entering the water, they built their nest, and reared a brood of seven young ones. The other was that of a partridge (*Perdix rubra*) on the same farm, which had made a nest on the gable-end of an old straw-stack, eight feet from the ground, and four feet from the top, and there also she brought off her young brood.

P.S.—One of your correspondents, in last month's Science-Gossip, wishes to form a list of good local flora; that of Norfolk, by the Rev. Kirby Trimmer, will prove all he can desire.—*E. A., Norwich.*

BOTANY.

Abnormal Rubus.—Perhaps the following anomalous proliferous bramble-flower may be worth noting, as during many years' researches among the *Rubi* I never met with a similar instance before. The flower is one of a short panicle, not the central one, which is abortive, and a secondary flower arises from the centre of one beneath, which has no styles, while in the upper one the styles are either converted into stamens or are abortive. The other flowers of the panicle are all regular, and show immature carpels, though but few in number. The panicle in this instance is short, and produced at the base of a dead one of the last year. This continuance of vitality in the flowering-stem of brambles to the third year is not often the case, though I have observed it occasionally, more especially in *Rubus suberectus*, whose barren shoots rarely or never take root, as is always the case with the common fruticose *Rubi*. The individual from which the proliferous flower here mentioned was taken belongs to the division of the smooth-stemmed *Rubi* with green leaves, and I should refer it to *Rubus Borreri*, as its nearest congener. The locality where the bush (a very dwarf one) grew was Hartlebury Common, near Stourport. —*Edwin Lees, F.L.S.*

Monstrous Wallflower.—"H. D." sends from Leamington a wallflower, with the following remarks:—"The enclosed is a wallflower; it is the second year that it has blossomed, if bloom it can be called, being apetalous, and the seed-pods are short when ripe, not more than half an inch long. Is it a common occurrence?"—It is not a very common occurrence, and I have never met with a case before; yet it has been observed several times, and Masters, in his "Teratology," enumerates the Wallflower amongst the list of flowers in which suppression of the petals has been observed. But in this particular specimen a still more interesting change has taken place; the stamens have become pistils. In some instances the change is only partial, and we have the stamens merely thickened and somewhat leafy in appearance, but surmounted by rudely-formed stigmas instead of being tipped with anthers. In other stamens a further change is observed; the flattened stalk is rolled inwards, and we have an approach to an ovary; whilst in others the change is complete, and the stamen-pistils contain ovules. Then again, there are some curious anomalies in the way in which these new pistils are combined. Some appear to be free; some are more or less united; whilst in other flowers the whole are connected, forming a complete sheath around the central ovary. This peculiar monstrosity is also well known, and is called in scientific language "pistillody of the stamens." It would seem to be sufficiently common in the Wallflower to have induced De Candolle to look upon it as a variety, and to have named it *Cheiranthus gynantherus*. An interesting account of pistillody of the stamens will be found in "Vegetable Teratology," pp. 302–310, with a list of plants in which it has been observed, including the Wallflower. The present specimen is interesting as combining with the metamorphosis of the stamens complete suppression of the petals.—*Robert Holland.*

Fasciation in Œnothera biennis.—This is of such common occurrence in the stalks of the Evening Primrose that it would be hardly worth recording, except for a peculiarity which has arisen in an example I have just found. The stem of the plant is considerably flattened, being apparently formed of at least four stems welded together. They are thus united for about a foot of their length, when the stem divides, each half being completely surrounded with the skin, showing that it is not split accidentally. Six or eight inches higher than this, the branches again divide for the length of one or two inches. Here they are not entirely surrounded with bark, and *might* have been split accidentally, but for the fact that they again unite, re-forming two branches only; but instead of the four branches taking their original position, they have crossed over and become welded into opposite stems, forming a complication very puzzling at first, but which will, perhaps, be understood by the following diagram.

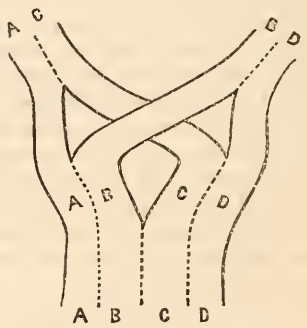


Fig. 105.

The upper branches, A C and B D, are each flattened out, and are covered with small bracts, like miniature green cockscombs.—*Robert Holland.*

Double Campanula.—Mr. Gilbert R. Redgrave sends an interesting example of *Campanula medium*, the old-fashioned Canterbury Bell, in which the corolla is double, one bell contained in another, not by the conversion of stamens into petals, but by multiplication of parts. Grindon, in "British and Garden Botany," says that the "hose in hose" variety of this species is not very uncommon. I have seen it oftener in *Campanula persicifolia*, in

which species the multiplication of petals often goes on to such an extent that the flower becomes intensely double,—a variety frequently found in cottage gardens in Cheshire, and probably elsewhere.—*Robert Holland.*

Lythraceæ.—In Science-Gossip for April last, Robert Holland describes the rupturing of the capsule of Cuphea, and he concludes by saying, "further observations will be acceptable." Many thousand miles away from Cheshire I have watched with the same interest the opening capsules of another variety of the same genus, which I find thus described in my note-book on the 8th of June last:—"A number of small suffruticose plants may be found in almost every garden at the military cantonment, Newcastle, Jamaica, 4,000 feet above the level of the sea. In many cases it is used as a boundary or border, and very well adapted it is, being pretty and compact; it is rather virgate, with small ovate-lanceolate, entire, exstipulate, opposite, almost sessile leaves; stem round; inflorescence somewhat racemose. Flowers solitary, on long extra-axillary peduncles, vermilion-red in colour; monochlamydious; calyx tubular, about one inch in length, with a blunt spur at the base, six-divided above the throat, two of the lobes being much larger than the other. Stamens 11, viz., 5 long, 4 shorter, and 4 short inserted into the calycine tube. Ovary free, and in many flowers bursting through the periauth, the seeds appearing through the semi-transparent pericarp. The figure 19357, Loudon, *Cuphea caudata* of Peru, best applies to the Newcastle shrub. The plant is in flower nearly all the year round, but this is found to be the case with many other flowers growing in equable climates. The derivation of the name Cuphea, viz. κυφος, curved, implies that the method of dehiscence, the bending back of the placenta, is an essential property of the genus, although it is not given as such in the Botanies I have been able to consult. Only for the measurements (calyx 3‴, petals 1‴) given by Greisebach, I would say the plant I have described was the *C. hyssopifolia*." The second plant of this family which I noticed in Jamaica, was the elegant Lagerstrœmia, the local name of which is Jamaica Crape. I find a note of it on the 25th June last. It belongs to the class and order Polyandria, Monogynia: calyx campanulate, 6-cleft, petals 6, unguiculate, rose-coloured, curved, and very much crumpled, like lace; a character which contributes greatly to the beauty of the tree. Stamens many, of which the outer 6 are largest. Capsule many-seeded; height of tree above 12 feet. The terminal branches are tetragonal, with winged angles, the leaves are glabrous, and the terminal panicle of flowers is made up of axillary peduncles. I believe I am correct in naming this tree *L. indica*, or the "King of Flowers." The third plant of the family that I have examined in the West Indies is the *Lawsonia inermis*, known in Barbadoes as Jamaica mignonette; but it is better generally known as Henna, or Al Khanna. It is a dwarf shrub, and its powdered leaves are used to dye the hands of Eastern ladies, an accession to their charms which other people regard with the same prejudice that they feel for the Chinese custom of distorting young women's feet. I first saw this shrub in Barbadoes, and it at once reminded me of Lagerstrœmia, the petals being of the same crape-like appearance, but white. The inflorescence a terminal panicle, and the branchlets tetragonal and winged. Its symmetry, however, is tetramerous; stamens 8. There are a few more Loosestrifes to be found in the West Indies, but I have not seen them. If any of your readers are sufficiently interested in the family, I will be glad to be introduced to the other members.—*J. P. H. Boileau, M.B., Bardadoes.*

Local Floras (p. 163).—I quite agree with "F. A. L." that we should not "take on trust from another what a little patience and trouble would ascertain for certain." A very "little trouble" indeed would, for instance, enable any reader to "ascertain for certain" that the work censured by "F. A. L." is *not the "Cybele" at all*, which contains very few "exact localities," and has been brought by its author nearly up to present date. The work referred to is probably the "New Botanists' Guide" of the same author. It is, of course, possible that I may be in error in this supposition, as "it is comparatively difficult to prove a negative;" but the "Cybele" certainly, in no way corresponds with "F. A. L.'s" description. Very few, except "practical working botanists," would undertake the amount of labour which "the production of a local flora" entails; so I would hope that "F. A. L.'s" strictures upon compilers are capable of modification.—*James Britten.*

Monstrous Ophioglossum vulgatum.—"W. G., Belfast," has forwarded an interesting frond of this fern, in which there are three fertile spikes; or more correctly, the spike is divided into three branches. Two of the branches also show an indication of further division. All ferns are prone to become forked, and we have met with similar examples before, both in *Ophioglossum* and in *Botrychium.*

Pine-apple (p. 139).—I am much obliged to "M. Q. M. C." for the drawing of the crest referred to in his note to Science-Gossip. The "pine-apples" carried in the raven's beak are very conventional imitations of nature, and look, perhaps, more like rose-hips than like either fir-cones or the fruit of Ananassa. Still I think that, for the reasons already stated, the cones of some kind of fir-tree are intended.—*Robert Holland.*

MICROSCOPY.

Scale of Barbel (*Barbus fluviatilis*).—We give herewith a figure of the very characteristic scale of the Barbel. There are yet a few other scales required to complete our series, and we should be glad to receive thoroughly authenticated specimens for that purpose.

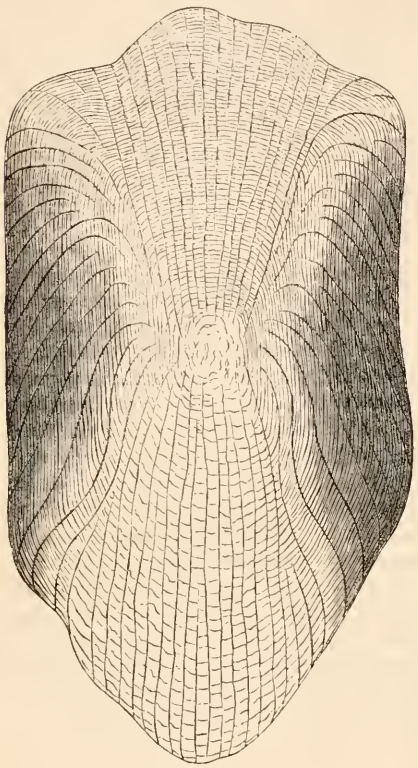


Fig. 106. Scale of Barbel.

Movable Table.—A description is given in the May number of Science-Gossip of a simple and convenient movable table or stand for carrying both the microscope and lamp, so that they can be moved about together without disturbing the adjustment of the illumination; and it may be of interest to add a description of another on a similar plan that I have found very satisfactory. It is a circular flat tray, eighteen inches diameter, and about a quarter of an inch thick, made of two or three thicknesses of millboard cut to the circle and pasted together, and covered on one side with black glazed paper, and on the other side with cloth or baize (using paste mixed with a little glue). The glazed paper is cut to a larger circle, and turned over the edge on to the other side before the cloth is put on, making a neat finish. This stand is light and conveniently portable, and has been found free from risk of warping or injury in several years' use. At a microscopical *soirée* a number of these stands have been used with decided advantage, each microscope with its lamp being on a separate one, so that the exhibitors stationed at the back of the line of tables were enabled to adjust any instrument or change the object exhibited whenever desired, by turning round the stand, without interfering with the line of observers in front of the tables.—*William P. Marshall.*

British Diatomaceæ.—We are glad to see that the second part of Dr. Donkin's work on the British Diatomaceæ has made its appearance, and we trust that now there will be no delay in its regular issue.

Monthly Microscopical Journal.—The completion of the fifth volume of this indispensable journal, and the commencement of a sixth with the July number, offers an opportunity for all microscopists who have not already done so, to order and obtain it monthly. Make a note of it!

Æcidium statices.—In Science-Gossip for last month you make mention of a cluster-cup (*Æcidium statices*) new to Britain, found by Mr. R. S. Hill, of Basingstoke. This discovery was reported to the Winchester and Hampshire Scientific and Literary Society at its last meeting. The cluster-cup was found on the sea-lavender growing on the shores of the Solent, the plant infested covering acres of ground. Since then I have found the same fungus, and with it the characteristic Uredine (*Uredo statices*) in large quantities near Hythe; the plant infested fringed the low muddy shores of the Southampton Water for miles. I ask the insertion of this, as the locality was given near Basingstoke, which town is twenty-five miles inland.—*Arthur Angell, Jun.*

[It was also found plentifully last June at Walney Island, and has been sent us by two correspondents from Lancashire.—Ed. S.-G.]

Handbook of British Fungi.—This work is now ready for delivery to subscribers complete, and will be in the publisher's hands by the time this journal appears. It is in two volumes, extending to near 1,000 pages, containing upwards of 400 illustrations, and will be indispensable to all students of fungi. Subscribers who have not paid their subscriptions are invited to do so forthwith, including one shilling for postage. Subscription copies *not* claimed before the 1st of October will be charged at the full price. Post-office orders to be made payable at Charing Cross.

NOTES AND QUERIES.

Otter.—On the 30th May a fine dog otter, weighing nearly 25 lb., was killed on the Esk, in the neighbourhood of Longton, Cumberland.—*G. H. H.*

The Missel-Thrush *versus* Squirrel.—I have read with much pleasure and amusement the Rev. R. Blight's graphic account of the battle between the Missel-Thrush and the Squirrel. The cause of the squirrel's visit to the thrush's nest can easily be explained, and the lady's vindictive conduct accounted for most legitimately. The squirrel is a most inveterate egg-sucker, and many gentlemen who wish to preserve their game are obliged, like the thrush, to wage war against the squirrel. I first learnt the squirrel's egg-sucking propensities some time ago, when I was visiting with my father at the house of a well-known sporting gentleman, one who is a great lover of animal life, passionately fond of nature in all its aspects, and who would not destroy one living creature unless obliged to do so from sheer necessity. Passing through the lovely woods, which surround one of the most charming country seats in Dorset, and viewing the landscapes from the most advantageous points, my attention was directed to some lovely specimens of American wood ducks, and rare acclimatized aquatic birds, which were flocking towards the banks of a beautiful lakelet, to welcome with the most peculiar cries the advent of their master, to whom they were particularly attached; I noticed on the branch of a tall oak overhead, a little squirrel playing the most droll antics. I turned from the feathered pets to admire the grace and agility of the exquisite native of our woods. At last I called the attention of our host to the pretty creature. "I am sorry you have shown it to me," he remarked in a voice of pity. "Why," I asked wonderingly. "Simply because I shall have to destroy the pretty little animal you so much admire." He raised his gun and fired. Alas poor Squirrel! it lay dead at our feet; and it had been so joyous, so happy a moment previously. I was astonished, and begged for an explanation. "The squirrels have eaten so many of my pheasants' eggs," said our kind host, "that, much as it pains me, I am obliged to wage war with them. Last spring my keepers had great trouble with them, and the eggs suffered very much from their depredations, harmless as they look." Most probably this will account for Mrs. Thrush's pugnacity.—*Barbara Wallace Fyfe.*

Hemp-Agrimony.—I am sorry that I overlooked Mr. Britten's question, until too late I fear, for my reply to find room in Science-Gossip for July. No! I did not mean "Agrimony." I wrote, as it was printed, "Hemp-Agrimony;" but ground *vine is* a misprint,—it should have been ground *pine*, as Mr. Britten opines. The Hemp-Agrimony has medicinal properties as well as Agrimony; but of a different kind. It is used in intermittent fevers (more perhaps abroad than in this country). The country people make tea of it; I do not believe that it has any *poisonous* properties, but I do know that it should be taken cautiously, as over-doses are apt to produce sickness and other disagreeable effects. Every portion of the plant is exceedingly bitter, but most especially so are the leaves. It is the "*Rusticorum Panacea*" of some old writers; Agrimony is the herb so often called "Liverwort," in allusion to the beneficial effect it produces in all affections of that organ: the scent of the flowers is rather agreeable, that of Hemp-Agrimony quite the reverse: few persons can mistake the one for the other. Agrimony has yellow flowers, Hemp-Agrimony purple; and the long stiff hairs, hooked at the end, which surround the fruit of the former, are very curious indeed; they cause the seeds to stick to one's clothes like a "clot-bur" does.—*Helen E. Watney.*

Fish of the Jordan.—"H. C. S. S." will find some information about the fish of the Jordan in Tristram's "Natural History of the Bible."—*J.*

Absinthe.—In the May number of Science-Gossip, Mrs. Watney says she believes that absinthe, which is such a favourite beverage of the Parisians, is made from *Artemisia Absinthium*. I find, on reference to Chambers's "Encyclopædia," that it is obtained from *Artemisia Mutellina*, *A. glacialis*, *A. rupestris*, *A. spicata*, &c., which are low-growing species found on the Alps, and known to the inhabitants of the Alps by the name of Genipi.—*L. S.*

Moths wanted.—I wish to get the following moths:—1. Death's-head Moth (*Acheronta atropos*), larva, pupa, and imago; 2. Goat-moth (*Cossus ligniperda*), larva; 3. Privet Hawk-moth (*Sphinx ligustri*), larva. Several specimens of each, preserved in spirit or otherwise, in order to be fit for dissection. Could you tell me how I can procure them? They are the illustrative preparation given in Rolleston's "Forms of Animal Life." I shall be very glad to pay or exchange objects for them.—*W. C. Crawford, 24, Gayfield Square, Edinburgh.*

Yellow Rain.—Shortly after my arrival at Yokohama, Japan, in April, 1870, we had two days of strong wind and very heavy and continuous rain, and it was observed that the rain brought down with it quantities of lightish yellow pulverulent-looking material, which was thickly deposited in gutters, rain-tubs, surface collections of water, and on the less-exposed portions of the ground, as a lemon-coloured scum. An appearance so unusual excited much surprise and some little alarm, as it was popularly believed that the yellow deposit was sulphur, and that it betokened some volcanic outburst in the neighbourhood, especially as earthquakes had been more than usually frequent, and the active volcano of Vries had evinced signs of disturbance. The microscope, however, showed it to be a harmless pollen, but I was unable to determine from what plant until the present spring, when I found that by gently shaking the male catkins of the common firs (*Pinus Massoniana* and perhaps *Pinus densiflora*), which grow abundantly on all the little hills and bluffs around Yokohama and were then in flower, I could obtain the colouring matter of the "yellow rain" at pleasure. The form of the pollen so shaken from the tree is quite distinctive; it shows a more or less hemispherical central portion, with two rounded prominences projecting from its flatter side; its appearance in profile being kidney-shaped, and it forms a pretty opaque object with the binocular. The quantity of it brought down by the rain and wind of last year must have been very great.—*H. H., Yokohama.*

Earth-worms.—Instead of the very dangerous and somewhat expensive poison, corrosive sublimate, allow me to recommend to your readers the use of freshly-prepared lime-water. I have tried both, and in effect give the lime-water the pre-

ference. It is really remarkable to see how quickly the worms rise to the surfaee, aud remain there quite long enough to be swept up. I am not sure if it will kill them. Our practice is to water the lawns with lime-water from an ordinary watering-pot, going systematically over the lawn, watering somewhat heavily. As the worms come up, they are gathered,—there is no difficulty in catching them, and given to the poultry. The lime-water has never injured the grass, whereas I have more than once done damage to it with corrosive sublimate. Black-beetles *are* a difficulty. Poison, if numerous, causes offence, from their dead bodies behind wainscoting, &c. Traps (Colin Pullinger's I prefer) seem the best. Can any of your correspondents name a *good* bait? I use bread steeped in ale. It is not bad, but is not sufficiently attractive. If some of your entomological correspondents could help us to bait Colin Pullinger's beetle-traps, I think we should beat the cockroaches.—*Henry Deacon.*

Destruction of Cockroaches.—I am very glad to be able to tell Mr. Verney a certain yet simple cure for these unwelcome guests, one that I have tried, and never known to fail. Take a *deep* dish, with smooth upright sides, say a very large pie-dish; put into it about two inches deep of beer or porter, sweetened with sugar. Threepennyworth of arsenic will be about sufficient to last four or five times, if measured out into equal portions. Slantingly from the edge of the dish to the floor lay a coarse towel dipped in beer and sugar, so as to form an easy pathway into the trap, which, if set at night, will be found to contain many captives before morning. We have quite relieved our house from cockroaches, and many of our neighbours who have adopted the plan I have just mentioned, have made a clearance of large families of these pests.—*Barbara Wallace Fyfe, Nottingham.*

[Another correspondent (C. B.) recommends Penny's Magic Paste. Others recommend remedies too numerous to mention, and all are warranted.]

Public Insectariums.—There is one branch of Natural History that is very generally neglected, and totally so as regards the exhibition of insects at our great Zoological Gardens in the Regent's Park. The insect world is a department of Natural History inferior to none, and, perhaps, superior in interest to many others. An insectarium, or eutomologium, or by any other, if more fitting, title designated, could be made on a large and comprehensive scale, and at much less cost, and, as I think, would cause much less labour to such of the keepers or attendants of our Zoological Gardens in the Regent's Park who would have charge of them, than any other of the creature kind in that exhibition. I have been always a great lover of entomology, although I do not pretend to an intimate acquaintance with the habits, &c., of the insect world. Yet, as a true lover of all branches of Natural History, I am, perhaps, better informed upon entomology than the majority of persons. After reading an article (or paragraph rather) in Hardwicke's Science-Gossip for April, 1871, entitled "New Introductions," it occurred to me that we might acclimatize many beautiful as well as marvellous forms of butterflies and moths, &c., so as to exhibit them in a somewhat natural state in a grand "Insectarium," or "Entomologium," house. I conceive that an insectarium, &c., would be, probably, as attractive, if not more so, than other branches of Natural History, and I therefore urge that a tide of public opinion may be impelled, that may lead to the erectiou of au extensive and spacious or lofty buildiug, for the "insect world," where we may study these smaller winged and unwinged creatures on an extended scale. We could have a hothousc insectarium, and also a temperate-house insectarium, &c., in accordance with the habitat or countries of insect creatures. But the insects of North America, of China, Japan, and other countries which possess a similar climate or temperature of seasons to our own England, could be reared in houses of an ordinary temperature. I am not capable of devising the shape or structural arrangements of an insectarium, yet I would suggest that the floor of an insectarium should be on a level with a man's or attendant's arms, so that the food and other necessary adjuncts could be put in easily, and without injury or annoyance to such delicate aud small creatures. And a central winding staircasc might be usefully made, that would enable the attendants to feed insects to which the upper regions of au insectarium were most congenial. The insectarium should be lofty, in order to give butterflies, moths, &c., the fullest space and enjoyment of their aërial flights. Trees, plauts, &c., of the kinds upon which iusects variously feed, should be planted, either temporarily or permanently, in the iusectarium cages; and thus we could study the habits and actions of insects more perfectly than we can by our private researches and contrivances.—*W. M. Macpherson.*

Flint Flakes, Machine-made.—The existence of "Palæolithic man" in the dim obscurity of far-back ages has been so strongly asserted and so stoutly maintained by our advauced men of science, that the judgment of the uninitiated has rather been taken by storm, than convinced by the weight of the evidence on which this extreme antiquity is founded. This evidence is mainly derived from the chipped flint "tools" of the first stone age, of which the flakes form by far the largest portion. Of these it is affirmed that the evidence of design is so clear "that a flint flake is to the antiquary as sure a trace of man as the foot-print in the sand was to Robinson Crusoe." On the other hand it has beeu affirmed that flakes result from the fracture of the flint by natural causes. I can produce a truthful witness in this case, whosc testimouy is unimpeachable and deserves to be widely known. My contractor for the construction of roads at Eastbourne uses Blake's stoue-breaking machine for preparing the metalliug, composed of a large cast-iron jaw worked by a steam-engine, by which the flints are crushed as fast as two men can feed the machine. From among these crushed flints I have picked out most typical and perfectly formed flakes, some so small as to require a glass to determine their claim to the honour of being flakes, with intermediate sizes up to five inches in length:—flake knives, scrapers, and cores. I have inspected most of the flint-finds from the Scilly Isles to Norfolk, aud on the Continent from Spiennes to Pressigny le Grand, but I have nowhere met with more perfect flakes as to type than those crushed out by the stoue-breaker. Many of the cores also are very perfect, being surrounded by six facets, from whence flakes were crushed off by one undesigned blow. If flint under ordinary pressure splits naturally into flakes and cores, how is it possible to maintain the supposed evidence of design on the flakes, and therefore of a designer? There is no intellect in a ton of cast iron; no volition in a steam-engine. It is highly probable that some

flakes were made and used by savage man, but before any firm reliance can be placed on some of the evidence lately put forward in support of Palæolithic man, we must learn to distinguish between false and true weapons,—between those formed by natural causes and those made by man.—*Nichs. Whitley, C.E., Truro.*

White Varieties.—The other day I gathered on the borders of a wood near here *Echium vulgare* and *Orchis pyramidalis*, with perfectly white flowers; and, on a down near, a specimen of *Thymus chamædrys*, also with white flowers, and having the leaves much lighter green and more delicate than usual. As neither of these species is commonly found with white flowers, perhaps you will consider the above instances worth recording.—*F. I. W., Winchester.*

Cleansing Skeletons (page 165).—I have heard, but cannot speak from experience, that the larvæ of the Dermestes (I think *D. murinus*) clean small skeletons, such as rats, birds, &c., in a much neater and better manner than ants. The animal should be skinned, soaked in water to get rid of the blood, then dried and put in a box with the larvæ. —*E. P. P.*

Cleaning Skeletons.—I have never succeeded in getting a skeleton perfectly and neatly cleaned by ants. Unless very hungry, they only care for moist substances; and for this reason I have always found that they will desert a specimen as soon as it has begun to shrivel and dry up, and the bones in consequence are left covered with hard, black, and unsightly remnants of flesh. The method which I have found the most successful is this:—If the object is very large, I bury it in a box, and there leave it until all the flesh is reduced to a pulp. This I wash and scrub off, and subsequently bleach the preparation in the sun until it is perfectly white. If the object is small, I macerate it in a decoction of water and blood, by which method you can constantly keep the specimen under observation, so that you can remove it immediately the flesh is properly dissolved, and before the harder ligaments have separated. If you hit the right time, you will have the skeleton naturally joined together without the intervention of wire fastening. It is advisable occasionally to change the mixture of water and blood, and if the water is sometimes added warm instead of cold, it will hasten the process. You should clean off as much flesh as is possible before you commence the maceration.—*Edward Fentone Elwin, Booton, Norwich.*

Gnats.—The communication of your correspondent "T. T. S." (p. 162) is indeed deeply interesting. The statement of an erroneous deduction is the less to be regretted when it elicits such an answer. It is now clear that the Gnat is able to drive its weapon to the hilt when it has the opportunity, and to bend the scabbard in so doing. The exact observation of the great French philosopher is fully vindicated. Judging, however, from the structure of the proboscis, and the known quiet habits of the sly English gnat, it still seems probable that it often gets all it wants by a slighter incision, and not by the violent method of its fiercer and bolder sisters of the Red River Settlements.—*S. S.*

White Strawberry.—A large bed of the Wild Strawberry (*F. vesca*) on a bank near this, has all the fruit *white*, with the exception of two or three plants which are red: is this a common occurrence? —*W. D. R., Dalbeattie, N.B.*

Transmission of Natural History Specimens by Post.—On the 1st August, after an interval of ten months, the advantage of cheap transmission of natural history specimens will be restored. The rates for letters and samples will be the same; and although, as compared with the old sample post, the rates (especially for small packets) will be higher, the increase will be compensated by the advantage of being able to send specimens fully packed and sealed up, and to enclose a letter in the same cover. The new rates will be—under 1 oz., 1d.; under 2 oz., 1½d.; under 4 oz., 2d.; and then ½d. for every additional 2 oz. up to 12 oz., which is the limit.—*G. H. H.*

Heartsease.— Mrs. Watney's notice of the above flower on page 163 of last number furnishes a remarkable coincidence of a common name in countries remote from each other, indicating, no doubt, a common derivation. The plant (*Viola tricolor*) in Danish *stifmoder blomst*, or in the Welsh called *Mam yn gyfraith*, or the Mother-in-law. This at least is very curious, and it may interest and amuse Mrs. Watney by ascertaining the above facts from her neighbours at Bnyn Hyfrid. The Welsh names for many plants are quaint and often highly poetical. *Llys y Drindod*, or "Trinity herb," is the "*Book*" name for the above plant.—*T. W.*

Books upon British Coleoptera.—"R. G." inquires about works on the above order in the July number of Science-Gossip. He would find Rye's "British Beetles," though modestly called by its author only "an Introduction," very helpful indeed, the figures being admirable. Of course, it only contains a selection. Janson's "British Beetles" is taken from the noted work of Curtis, revised to the date of publication (1863), and this also has well-executed figures, about 260 in number. Besides Stephens's well-known "Manual," published thirty-three years ago, and therefore not now to be entirely trusted to, there is a work useful for reference, which appeared a year or two after. This is entitled "Spry & Shuckard's Coleoptera delineated," and has 100 plates, each with many specimens, and gives types of every genus. The authors were, unfortunately, hardly up to the task they undertook, so their observations must be cautiously received. A curious old book by Thomas Martyn, giving an account of 500 species, with figures (date 1792), may be picked up occasionally at a book-stall.— *J. R. S. C.*

Luminosity of Plants.—As I see no further paper on this subject in the July number of Science-Gossip, I venture to express my belief that in the cases of red geraniums, marigolds, and some other plants, the flashes of light seen are optical deceptions. The light is not seen in the *dark*, but only in the *dusk*, when the fading light is somewhat confusing. The light of the plant, if real, should certainly be brighter in the dark, instead of not being then at all visible. Again, I always find, and should be glad to know if *others* do, that if the eye is fixed upon a particular flower, the flashes are not seen, while they are very visible the moment the eye is, as it were, loosened and allowed to wander over the flowers. And then, as far as I can make out,—and I am constantly trying, the flashes never come to the eye straight, but always at an angle with the axis of the pupil. Very likely some plants are really phosphorescent, but in that case the appearance would be very different.—*E. T. S.*

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them.

M. Q. C.—1. We do not fear that the use of a monocular microscope will injure the eyesight. 2. We do not think the monocular *superior* to the binocular, especially for low powers.

E. L. R.—*Alnus glutinosa-laciniata.—B.*

Dr. J. P. H. B.—Cannot you send specimen? Have you consulted Dr. Grisebach's "Flora of the West Indies"?

J. J. calls attention to "H. E. W.'s" anecdotes, and refers to "Country Life," 1867, p. 231, for two of those cited in S.-G. 1871, p. 40; only that the "young lady" was then a "London nursemaid." Is this an example of "Natural escent"?

C. E.—We never attempt to name objects from description.

J. H.—It seems to be the *Mermis nigrescens*. See S.-G. 1867, p. 221.

M. A. L.—The only book likely to meet your wants is Cooke's "British Fungi" (Six Shillings), published by Hardwicke.

C. W.—We confess that we know nothing of "musical sand."

C. L. will find an account of the "Coronella" in "British Reptiles," published by Robert Hardwicke, with coloured figure.

R. T. A.—We are unable to give you any advice as to disposal of "preserved insects," &c.

E. H.—It is very difficult to determine the larvæ of beetles, &c. At present yours are not identified.

W. H. W.—An *Ixodes*, probably *Ixodes Pari*. See Leach in "Linnean Transactions," vol. xi. p. 398.

F. I. W.—*Eurotium herbariorum.*

G. S. T.—*Arcyria punicea.*

E. P. P.—1. Enough benzole to render the dissolved resin of the required consistency. 2. East Indian dammar. 3. Pound the gum, shake or stir whilst dissolving. 4. Yes, if requisite to soak in anything. You seem to have used some other resin (copal?); hence the failure.

A. B. E —Smallest larva undeterminable in its shrunken state. Large larva, *Clisiocampa neustria*. Cannibalism in caterpillars not unfrequent.—*F. M.*

W. L. W. E.—*Phlomis fruticosa*, Ait.—*B.*

W. B.—*Rumex acetosella*, L. What botany do you use?

B. R. and H. L.—Put them in a bottle with bruised laurel-leaves.

W. Y.—You are not likely to get it in this country at all.

S. R.—Have you read our instructions to correspondents so often printed at the commencement of this last page? We do not insert lists.

L. R R.—Apparently a *Cotoneaster* near *C. bacillaris*. "The Gardener's Chronicle," "Journal of Agriculture," or "The Gardener's Magazine," are more suitable media for obtaining the names of garden plants.—*B.*

G. S. S.—1. *Geranium Robertianum*, var. *purpureum*. 2. Apparently only *Arabis hirsuta* more hirsute than usual.—*B.*

S. H. G.—Books are not eligible for exchange list.

A. E.—We only know of Paxton's "Dictionary," and the "Cottage Gardener's Dictionary."

E. B.—You will find its occurrence noted in back volumes of this journal.

S. S. (Brighton)—Please send correct address.

T.—A trap to catch the unwary.

W. P.—Too long for exchange column.

L. F.—1. You will find an article in the "Popular Science Review," No. 24. 2. The monstrosity you describe is not uncommon.

F. C.—Send larger specimens, and affix numbers.

H. F. P.—*Polyporus rufescens*, Fr. Cooke's "Handbook," No. 740.

J. L. P.—*Anthrenus xanthura*, Kirby, female.—*F. W.*

B. W. (Taranaki.)—1. *Helophilus agerinus*, Walk. 2. *Musca quadrimaculata*. 3. *Musca Læmica*, White.—*F. W.*

L. T.—1. *Trichostomum tophaceum*. 2. *Hypnum falcatum.* —*R. B.*

R. V. T.—1. *Bryum cernuum*. 2. *Hypnum Swartzii.—R. B.*

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Ptinus pertinax (a hooded beetle) offered for microscopic material.—Rev. Jno. Hanson, 14, Bagby Square, Leeds.

Pike Scales prepared for mounting. Send stamped envelope.—J. H. M., 17, Walham Grove, St. John's, Fulham, S.W.

Cleaned Spicules from *Holothuria* and *Tethea Lyncurium* for other spicules or matcrial (not seeds or scales).—C. E. Osborn, 28, Albert Road, Upper Holloway, London, N.

Feathers of Humming Bird and portion of Peacock ditto, &c. (unmounted), for other good objects and stamp.—C. D., 187, Oxford Street, Mile End, E.

For Grayling Scales send stamped envelope to J. Sargent, Jun., Fritchley, near Derby. (Any microscopic object acceptable.)

Batrachospermum moniliforme for any of the rarer marine algæ.—T. Rogers, 7, Cookson Street, Manchester.

Fossils, mostly Oolitic, offered for others.—Send lists to Dr. Parsons, Beckington, Somerset.

Paste Eels wanted. A full equivalent for a few will be thankfully given.—A. N., Fareham.

Pyrola rotundifolia for any British fern dried, except *Aspidium Filix mas* and *Ophioglossum vulgatum*.

BOOKS RECEIVED.

"The Natural History of the British Diatomaceæ." By Arthur Scott Donkin, M.D. Part 2. Van Voorst.

"The Australian Medical Journal." Nos. 119, 120, March and April, 1871. Melbourne: Stillwell and Knight.

"Transactions of the Woolhope Naturalists' Field Club for 1870." Hereford, 1871.

"Cope's Tobacco Plant." No. 16, July, 1871. Liverpool.

"Journal of Applied Science." No. 19. July, 1871.

"Proceedings of the Liverpool Naturalists' Field Club for 1870-1."

"Monthly Microscopical Journal." July, 1871.

"Deschanel's Natural Philosophy." By Professor Everett. Part 2. Heat. Illustrated by 150 Engravings on wood. London: Blackie & Son.

"Catalogue of British Coleoptera." By David Sharp, M.B. (One Shilling.) London: Janson.

"The Popular Science Review," for July, 1871. London: Robert Hardwicke.

"Catalogue of Birds, Insects, and Squirrels collected in the vicinity of Toronto, Canada." By Alexander M. Ross, M.D., &c. Toronto, 1871.

"The Animal World," for July, 1871.

"Land and Water." Nos. 284, 285, 286, 287.

"Boston Journal of Chemistry." July, 1871.

"A Key to the Natural Orders of British Wild Flowering Plants." By Thomas Baxter, F.G.S. London: Simpkin, Marshall, & Co.

"The American Naturalist," for July, 1871.

"Proceedings of the Geologists' Association." Vol. II. No. 1. April, 1871.

"The Australian Medical Journal," for May, 1871.

Communications Received.—W. D. R.—E. L.—C. M. E. —N. W.—W. C. C —H. D.—T. L.—H. E. W.—J. H. G.— H. H.—M. M. M.—W. H. H.—M. Q. C.—W. L. W. E.—J. B. —W. W. S.—M. A. L.—C. W.—G. S. S.—C. L.—A. B. E.— E. C.—F. I. W.—B. W. F.—C. B.—R. H.—W. H. W.—L. S.— C. J. W. R.—L. R. R.—G. S.—W. N.—T. W.—S. B. B.— J. H.—E. A.—A. A.—E. P. P.—J. H.—J. H. M.—F. B.—J. B. —M. A. D.—E. F. E.—J. R. S. C.—B. W.—J. L. C.—E. T. S. —C. E. O.—G. H. H.—B. R.—C. I. D.—J. S.—W. Y.—W. D. R. —H. F. P.—R E.—S. S.—S. H. G.—A. E.—J. W. G.—E. B.— F. C.—A. E.—T. R.—H. L.—E. C.—A. N.—L. F.—J. L. B.— W. P.—W. H. H.—E. W.—F. A.—W. B. G.—J. G.—T. G.

HORNED BRITISH CATERPILLARS.

THE British Islands, as compared with other countries, cannot be said to be rich in curious or grotesque caterpillars, though we have some very singular forms amongst our natives. It is now pretty generally known, even to those who make no pretensions to be lepidopterists, that we have many hundred species of that order of insects, some exceedingly abundant, and others only known to be British by one or two specimens; and a number of gradations as to scarceness or commonness intermediate between these extremes. We have an overwhelming preponderance of moths over butterflies; against sixty-five of the latter, the former can muster something like eighteen hundred species. The splendidly illustrated works which have been published descriptive of foreign butterflies, and the changes they undergo, show that more singularities occur amongst the caterpillars of butterflies than amongst the moths. Therefore it follows that had we more butterflies in Britain, we should be able to show more remarkable caterpillars than we can exhibit at present. I say advisedly, *at present*, because there are some folks who are attempting to acclimatize here certain foreign species. These, as far as they have gone, do not, however, hold out much hope that "illustrious foreigners" of the lepidopterous race of beings are likely to settle permanently here. But if we have not so many choice insects to hunt after as a resident in Brazil, in India, or in China, on the other hand we have this compensation that we have fewer insect annoyances, and we can go out to catch or to observe insects without being scorched by a tropical sun, or dashed to the ground by a tornado; or, worse still, finding ourselves made a sudden target for the arrow or spear of the wild wanderer.

As yet we have no classification of caterpillars generally, according to their outward aspect; nor, were it done, would it help us at all to discover what insects they were to be the parents of, for caterpillars which are most different from each other in appearance, in some cases produce moths nearly related.

Of the adornments—for such they may justly be deemed—which are displayed by some of our British caterpillars, a goodly list could be made. Besides an almost endless variety in colour and markings, we have additional distinctions in the way of hairs, spines, warts, humps, lappets, tubercles, and *horns*. It is of the chief of these, rejoicing in the last peculiarity, that I have now to write, and in the forefront we must place the caterpillar of the Swallow-tail. This butterfly (*Papilio Machaon*), recently commented upon in this periodical, is an insect of some importance, as our only representative of a very large exotic family. The caterpillar is to be found throughout the summer feeding on marsh plants, especially on the hog's fennel, or milk-parsley. Some who have kept them in confinement have fed them on the leaves of carrot or rue. The velvety skin, which is studded with fine bristles, is beautifully marked with spots and bars in black and orange upon a green ground; but the second segment is the most singular part of the body. From this, when it chooses, the Swallow-tail caterpillar thrusts forth, through a slit in the back, a two-forked horn (as we must call it), which is something like the letter Y in shape, and half an inch in length when fully shown. This weapon—if weapon it be—owes its efficacy to the fact that it is hollow, and if the forks of the horn do not actually exude a fluid, they at least give forth a strong scent, which may drive off insect enemies or parasites. It *may* be so, and that is all we can conjecture about the purpose for which it is intended; though Bonnet, in

his work on insects, says that a caterpillar of *Machaon* which he touched, directed the horn towards the fingers as if to strike. Other observers have not as yet confirmed this. When it thinks fit, the caterpillar can entirely hide this apparatus from view, its place being only denoted by two dots; and, singular to say, it occasionally protrudes one part of this Y, keeping the other within. The odour is so strong, one entomologist notes, who had caterpillars in rearing, that it scented the garden for some distance powerfully. And also it has been found to bear a resemblance to that of the particular species on which the caterpillar feeds.

One other caterpillar from which springs a British butterfly is also a "horned beast," and its adornment, though differing from that of the Swallow-tail, is nearly as remarkable. The Purple Emperor (*Apatura Iris*) is a species much sought after by butterfly-hunters, and prized on account of its beauty, and the difficulty usually attending its capture. The caterpillar few have found. Though it was formerly reputed to be an oak-feeder, it is more generally discovered now on the sallow. When first hatched, the body of the little Emperor (to be) has nothing particular in its appearance; after the first change of skin two horns are developed, which are attached to the head; they are then longer, in proportion to its size, than at any later period in the growth of the caterpillar. Feeding on until rather latish in the autumn, it then, as Dr. Maclean has observed, descends to an angle of the twig below where it has been feeding, and spinning a slight pad of silk, fixes itself there, with its horns extended straight in front, and waits for the return of spring. The full-grown caterpillar is about in the early part of the summer, showing a particular dislike to be touched or handled. "When feeding," says Newman, "it bends its somewhat obese body with the facility, and I would almost say *elegance*, of a slug; but I fear many will scarcely appreciate the comparison." Very likely not. There exists this notable difference between the horns of this caterpillar and those of the mollusks; they cannot be withdrawn, and they move only with the head to which they are attached. The position of the mouth when the caterpillar is engaged in eating makes them at that time point backwards, at other times they are directed in front. These horns are tinged with blue at the fore part, whitish behind, the tips approaching to black. The caterpillar of the Purple Emperor has not been observed to make any use of these appendages.

Amongst our British butterflies there are no other species with horned caterpillars; though in some of the fritillary tribe, as for instance in the Silver-washed (*Argynnis Paphia*), at a hasty glance the caterpillar seems to be horned. This aspect is due to a pair of spines which point forwards over the head. Let it be noted here, before passing to other horned kinds, that, unlike quadrupeds, whatever horns they have are rarely, if ever, *horny*, which seems Hibernian, yet is true.

The bulk of our horned British caterpillars are to be found in that family of moths which Linnæus grouped together in his genus *Sphinx*, now subdivided and placed amongst the body of moths called the *Nocturni*.

Our largest native caterpillar is that of the Death's-head Hawk-moth (*Acherontia Atropos*), the name "hawk" being given to this and others as significant of their rapid, and frequently very straight flight. The Death's-head caterpillar is about four inches long; though feeding occasionally on other plants, it most frequently haunts the potato, and its presence sometimes occasions in the mind of the uneducated much vexation and consternation, for it is regarded as injurious, and in the Midland counties called a "lokns." Like a number of other caterpillars in the family, this has seven stripes along each side, which meet on the back. The horn is above the tail of the caterpillar, and does not possess the power of motion. It is peculiar from having a double bend, and it is also rough. Kirby and Spence first remarked that the Death's-head caterpillar had the power of uttering a distinct noise; and Newman has confirmed the statement, the circumstance being an unusual one in caterpillar life. The full-grown individuals retire to a considerable depth in the ground to enter upon their repose in the chrysalis state.

On privet bushes in August and September, sitting at early morning in what is called the "sphinx attitude," the caterpillar of the Privet Hawk-moth (*Sphinx ligustri*) attracts the notice occasionally of non-entomologists. It is of considerable size when adult, displaying then to perfection the seven stripes, which are broad, and half purple, half white. The horn at the tail curls back, and is black above and yellow beneath. From its size this caterpillar proves a *bonne bouche* to a hungry bird, and, as a wise precaution, it seems generally to keep under cover of the twigs, with the exception already noticed, so that the popular proverb may hold good in this case that the early bird catches the caterpillar.

Much more rare is the caterpillar of the Convolvulus Hawk-moth (*Sphinx convolvuli*), which feeds on the species of convolvulus or bindweed, concealing itself during the day on the surface of the ground, or going a little way beneath it. In this species the stripes are black and white, and the horn is yellowish.

Different as are the perfect insects of the Poplar Hawk-moth (*Smerinthus populi*) and the Eyed Hawk-moth (*S. ocellatus*), the caterpillars are very similar, and they both have a partiality for the leaves of the willow and poplar. The Poplar Hawk caterpillar is indeed said to feed occasionally upon

the laurel and laurustinus also, but this is questionable. Though there is some difference in the tint of the stripes in the two caterpillars, and also in the ground-colour, we are at once enabled to see "who's who" when we examine their horns. The Eyed Hawk exhibits one which is decidedly blue, the Poplar Hawk caterpillar has at its tail one of a yellow colour, inclining to red. The year 1870 furnished our entomological collections with a number of specimens of a Hawk-moth usually of great scarcity. This is the Bedstraw-hawk (*Deilephila galii*), and which, for some reason known to itself, seems, while in the caterpillar state, to prefer to feast upon this plant when it grows near the coast. This caterpillar is so liable to vary, that as many as sixteen different varieties of it have been enumerated. The ground-colour is sometimes olive, in other examples black, varying in shade in different parts, and having spots distributed over it with more or less regularity. One of the most remarkable peculiarities in the appearance of this rarity is, that after the last change of skin nearly the whole surface has a polished appearance. The horn, which it bears like its brethren, is deep red, and partly transparent. Allied to this species, and also of scarce occurrence, is the Spurge Hawk (*D. euphorbiæ*) and the Striped Hawk (*D. livornica*). There are other horned caterpillars in this family of moths, which we must pass over, noticing next the caterpillar of the Humming-bird Hawk (*Macroglossa stellatarum*). The moth may be seen even in the vicinity of towns at different dates in spring, summer, and autumn, flying by day or at the twilight hour, rarely in the darkness of night. Hovering over the blossoms with a sonorous hum, its eyes sparkling as it inserts its trunk to obtain the honeyed treasure it seeks, then dashing off with rapid wing at a rate which puts its capture out of the question. The Humming-bird Hawk deserves to be ranked amongst the liveliest of its tribe. Not a few stories which have been circulated regarding the appearance of real exotic humming-birds in our islands have originated with those who have watched the aërial manœuvres of this insect. The caterpillar feeds in the summer on some of the Bedstraws (*Galium spec.*), and suffers at times considerably through the sudden drying down of its food-plants, in consequence of dry or hot weather. When the supply of leaves fails, it proceeds to devour the fruits and stems of the plant, and, if the season is favourable, grows with great rapidity. This caterpillar is small compared with its brethren, brownish, tinged with white and blue, with a horn thin and sharp-pointed. It does not descend far into the earth to undergo the change into the chrysalis state, probably because this usually lasts only for a few weeks. Then, again, the caterpillar of the Elephant Hawk (*Chærocampa Elpenor*) distinguishes itself by exhibiting the most beautiful eye-like spots on the sides near the head. The front segments of the body are attenuated, and from this peculiarity the creature was supposed to resemble the trunk of an elephant. The horn is thick and blunt. In gardens we find individuals of this species feeding sometimes on vine or fuchsia; in the open country they seem to prefer the willow-herbs. All families have aberrant individuals, and the Small Elephant (*C. porcellus*), unlike others of the Hawk-moths, has a caterpillar which is hornless. Proceeding to a very different family of moths, forming part of what were formerly called the *Bombyces*, we come again upon horned caterpillars, and here we have the horns going in pairs. Conspicuous amongst these is the historic Puss Moth (*Dicranura vinula*), whose portrait Isaak Walton painted so long ago in his "Angler." Many a time had he seen this caterpillar feeding on the willows which overhung the pleasant Lea in Hertfordshire, where I have myself frequently captured it. Here the horns come in the place of the last pair of legs or claspers, being placed at the extremity of the body. As the caterpillar crawls along, they are raised into a perpendicular position. At those times when it is reposing, it holds firmly by the eight claspers, and raises the head also in the air. But at an early age the horns are extended flat, and brought close together when it is not feeding, and being then dingy in colour, the caterpillar looks exceedingly like a black cat in miniature, watching, with extended body, to pounce upon some prey. Some account of this insect will be found in the volume for 1870, pp. 105, 124; and to what is there stated I would only further append my own doubts as to whether the inner horns or *tentacula* have any efficacy in the driving off of ichneumonideons parasites; and, also, that in the adult caterpillar, the force with which it can eject the pungent fluid from the head is very noticeable, and the seeming (at least) accuracy with which it directs this to the eye of the entomologist or to some sensitive part. By means of this, too, the moth is subsequently enabled to release itself from the hard cocoon in which the chrysalis was encased. Three other species, allied to the Puss Moth, are called the Kittens; these are smaller and less common,—one, indeed, being exceedingly rare. In their structure they are alike.

Probably the Lobster caterpillar, which produces the moth scientifically called *Stauropus fagi*, is the most unique in form of all our British species, though not of large size. The second and third pair of legs are singularly and, as we might think, unnaturally enlarged, and along the back is arranged a series of twelve humps: at the extremity of the body are two horns, which are rigid and slightly curved. These do not possess inner horns or filaments. This caterpillar feeds on oak, and other trees in the autumn. Early in the spring, occurring principally in the woods of Rannock, flies the

Kentish Glory, otherwise called *Endromis versicolor*, which, if it be indeed a glorious species, has apparently ceased to honour the country whence it takes its name, through the destruction of much of the woodland it delighted in. The caterpillar of this moth reminds us somewhat of those of the Hawk-moths, being stout, and also striped. When first hatched, each brood divides into two or more colonies, which form a web for their protection. They are then studded over with minute warts or points, slightly hairy and smoke-coloured. After several changes of skin, they appear in full costume, being then an inch and a half in length. The ground-colour is green, varying in hue, the stripes being white and a darker green. A hump above the tail is prolonged into a white horn.

We have thus glanced slightly at the greater number of our horned British caterpillars, and though the transformations of most of these have been watched from the egg, there are still facts regarding them which have not yet been discovered, since it needs long and careful observation to make out the full history of a species.

J. R. S. Clifford.

MARINE AQUARIA.

Sea-water.—Artificial *versus* Real.

AQUARIA, and all things pertaining to them, have been so often written about of late, that I should feel very reluctant to offer any remarks on the subject, had not a gentleman who reads Science-Gossip (and I believe writes in it) written to ask me to detail *my* experience of *artificial* sea-water, and the management of a marine aquarium, in the pages of that magazine.

The first aquarium I ever set up (for I do not call the different little attempts I had made when staying on the coast to keep some of the common objects found there, for a short time in wash-hand basins and finger-glasses, aquaria) was a very pretty cylindrical glass vessel,—I did not venture upon a tank then, in those early days of aquarium fashion, and it was supplied with clear, perfectly pure *sea*-water, purchased in *London*, sea-water which was kept for the especial purpose, of proper specific gravity, at an establishment near the Regent's Park.

This, my first aquarium, gave me the least trouble of all in respect to the water; but it was stocked for me by a gentleman who was quite *au fait* in the matter. Rock-work, sea-shingle, *algæ*, and all were properly prepared and grown before they were transferred into my wee glass ocean, which was made perfectly fit for the introduction of animals ere I began to collect live stock.

Having succeeded well for a few years in keeping various zoophytes in first-rate condition, by means of these unpretending glass bowls, in a house situated in one of the London squares (Tavistock Square), I determined, on going to live in the country, to try Marine Aquaria on a larger scale. I was distant ten miles from the coast, so I set up three kinds of marine homes; in one I used the purified sea-water, procured from London; the other was filled with artificial sea-water, made with Gosse's compound, the third stocked with sea-water taken from off the beach at Southsea. This aquarium caused me the most grief; but it was great fun also, to drive down from my little den at Hambledon, and spend the entire day on the shore collecting, though there was not much variety there, and returning home in the cool of the evening, through those green Hampshire lanes, the pony carriage laden with jars of salt-water, and hamper full of sea-weeds,—*the* hamper, which had in the morning been the receptacle for our sandwiches and sherry.

Sea-water, taken out at sea, some distance from the shore is a very different fluid to what I got on Southsea beach, or indeed from what I obtain here, on the shore near Beaumaris.

It had to be filtered through flowerpots stuffed with pieces of sponge instead of corks, the sponge left quite loose enough to allow of the water passing in a rapid *drip* down into the vessel below, then allowed to settle; then it had to be stirred up again and refiltered, until it became purified from all the filth and decomposed matter which it at first contained; becoming in the end as clear as crystal.

Artificial sea-water requires the same kind of preparation in a modified form; it too needs filtering, and testing, by means of gravity-beads. There are two kinds of beads sold by dealers in aquaria, called "specific-gravity beads." One of these balls floats when the water is a right strength, and the other sinks. Directly the floating ball begins to sink, it shows the water is weak, and if the sinking bead *rises*, add a little *fresh* water until you see it begin to fall again. Evaporation will cause an increase in the density of the water.

Gosse's formula, if you get the *dry*, in one-pound packets, must be mixed in an earthen vessel; some pieces of sea-weed should be thrown in, and all left to stand for a week or ten days (three gallons of *spring* or *river* water to a pound of the dry preparation is the correct proportion). At the expiration of this time, transfer the water into your tank, and place the sea-weeds—I used small tufts of *Ulva* and *Enteromorpha;* for I discovered they were the best to have at first, though I afterwards introduced other kinds for the sake of variety. Here let me remark that all sea-weeds put in an aquarium should be in a *growing* state, attached to small pieces of rock. If you collect for yourself, go down to the beach with wallet and hammer, when the

tide is fully out, and chip off some nice bits of weed-covered rock. Should you light upon an empty oyster-shell ornamented with serpula, or the habitation of a defunct whelk, pop them in your bag; they will look natural, and *therefore* well, on your miniature beach; but never, I implore you, put litte bits of coloured glass or foreign shells in your tank. A China mermaid, or one of those porcelain representations of wonderful-looking lobsters and crabs, worked up into inkstands or match-boxes, which the fancy shops of Robertson-street, Hastings, abound in, would be every atom as *suitable*. The object to be kept in mind is this, to make your aquarium look as like a real sea-pool as possible.

Pass all the water through a filter after you have placed the rock-work and sea-weeds in; and, when your beach has been laid down (the beach, I need scarcely tell you, should be composed of shingle aud a little sea sand), let a day elapse, so that the water may be quite bright before you introduce your animals into their future home. Get a few "Mes" at first; they are the most hardy kinds, and are commonly known as the "Strawberry Anemone." Wait a little, and see how they thrive ere you put in more stock.

The chief fault almost all aquarium-keepers fall into at first, is over-crowding; they put in too much animal life. Three anemones to the gallon, as my Cookery Book would express it, are the right number.

Collectors who have kept fresh-water aquariums may deem that a sufficiency of sea-plants will keep up the proper amount of oxygen; but they must not depend ou this. Fresh-water plants and fresh waters are very different to marine; the former tanks require neither filtering nor aëration; the latter must be constantly agitated by any one who wishes to keep the creatures in a healthy condition. They are accustomed to it in their native submarine homes, and therefore I continually either used, what a very clever writer on aquariums called "the drip pot," that is, hung a flowerpot, with a piece of sponge in it, over the tank of a morning, and having filled it with water from the tank, let it drop in, or gave the fluid in the tank a gentle stir.

There are a few appliances which I found it requisite to purchase, and which I will now mention. First of all, the gravity-beads, before alluded to—they cost me two shillings; a siphon to draw off the water with (I used gutta-percha tubing at first for this purpose, but found it objectionable); woodeu forceps like long sugar-tongs, to feed the anemones with, and a syringe to aërate the water: they all cost about eight shillings (the filter I made, as you have read, out of a flowerpot suspended over the aquarium); and the "sponge-stick;" also, for cleaning the glass sides of the tank, an old cane, with a little wash-leather tied securely round the top, is all that can be required.

I have just had a full account of some aquaria on a large scale, which have been fitted up at a country house in Hampshire by a well-known dealer in "marine stores;" but were I rich enough to procure such an expensive ornament to my grounds, I am very sure it would never afford me the pleasure my lawn pond and greenhouse aquaria did at "the Lodge."

The amusing adventures met with when collecting objects, some of our party looking doubtless, in the eyes of the rustics we met, greater objects than the queer specimens we carried, were in themselves a source of great entertainment. I remember one morning especially; a friend, my little boy, and self, started after breakfast to dive into the mysteries of a shallow pond about three miles distant. I wanted to procure a few water-beetles; and, having secured the kind I wanted, sat down on the bank by the side of the pool, while "Mokwa" began to draw the mud, for the said pond looked more like mud in a state of solution than water. "Mokwa," I should explain, was a *nom de plume* given my friend during his residence in the wilds of North America; it is, I believe, Indian for Grizzly Bear. My boy sat by me, patiently waiting until I should finish decorating his straw hat with some wild flowers he had picked. We were suddenly startled by a loud gruff "hem;" I looked round and saw a face matching the voice peering over the hedge at my back. "Hem" was uttered again; I looked down at Bertie's hat; I did not want to appear frightened, but I was desperately so.

A vision of the elderly gentleman, whom Dickens so graphically describes as having fallen in love with Mrs. Nickleby, and showering marks of his affection on her over the wall in the shape of cucumbers, came to disturb my serenity; for there were some formidable turnips in the field. Mokwa, however, heard the third "hem," and rushed up the bank.

"What are you catching?" asked the great unknown, in a voice of thunder.

"I regret to say that I am not catching anything," replied Mokwa, with au indescribably comic expression.

"What do you expect to catch?" was asked, still more imperiously.

"Tadpoles, sticklebacks, and caddis-worms," was the auswer given this time, in a *fac-simile* voice and style. The curious seeker after knowledge seemed a little put out. He turned agaiu to look at me; I cannot flatter myself that I was at all calculated to reassure him, in a large straw hat, with a flower-bedecked boy ou my lap, and a bottle full of beetles by my side,—I certainly did not present a very sane or enchanting appearance, aud I am equally certain that nothing like Mokwa's Indian

head-covering and leathern miner's jacket (for his bearship had been in California at the diggings) had ever met his eyes before. I saw doubts of our sanity working in his face. He turned away rapidly, and strode off over the turnip ridges, thinking, poor man (as he afterwards confided to a friend), that we were a party of lunatics out for a holiday from Fareham Asylum; "for what, I ask you, Farmer Stubbington, could any ere people in their senses want a catching them nasty worms and beadles for?" and he considerably disturbed his family's peace of mind at dinner by telling them what dangerous characters there were in the vicinity of "Hoe Farm" that day, while we returned to our lunch, and amused the Hon. Mrs. Cochrane and Miss Williams with an account of Farmer T.'s discomfiture.

It is astonishing how profoundly ignorant some of the lower classes still are, despite the progress of education, in respect to natural history. I have seen a butterfly-collector followed by a crowd of rusties, men, women, and children.

"Poor man, he baint quite right in his head."

"It's easy to see he have a soft place there."

"He is a button short, or he'd never be fishing in the sky instead of the sea," were a few of the remarks made, and one bright youth suggested that "the gentleman ate them things, like mother's eat did the crickets."

Once, on an excursion to Southsea, I found two friends, who had started early in the morning, surrounded by a parcel of boys. They were seemingly much amused, and one of them having overheard a remark to the effect that the lads believed they belonged to the show that had just been in Portsmouth, they aided the delusion, by saying, "How the Mermaid, poor dear, will enjoy these jelly-fish (sea-anemones) for her supper," &c. When La Comtesse de Manin and myself put in an appearance, I conclude they imagined us to be "show people" also; for they continued to follow; but after the lunch-hamper was opened, and Mr. Maybridge asked, "Countess, will you have sherry or sherry-and-water?" they all scampered off, evidently too polite to stare at a lady eating bread and butter; so showing more true, instinctive good feeling than a person in the rank of a gentlewoman, whom I really heard call to her two daughters to "come and see the Prince of Wales eat strawberries," adding in a loud voice, a voice perfectly audible to His Royal Highness, "He eats them just like any other man."

Little grey mullet do well in an aquarium; they are very pretty, and I think a goby is of infinite use, for he helps to disturb the water, by constantly darting in and out from amongst the tufts of plants and pieces of rock, in *search* of food: small mullets also are excessively lively. The Cinderella of the tank is the Periwinkle, a common but useful member of marine society. He clears the glass sides, enabling you to see with perfect facility the beautiful living flowers contained within.

> "Here too, were living flowers,
> Which like a bud compacted,
> Their purple cups contracted;
> And now in open blossoms spread,
> Stretch'd like green anthers many a seeking head,
> And arborets of jointed stone were there,
> And plants of fibres fine as silkworm's hair."
>
> SOUTHEY.

HELEN E. WATNEY.

Bryn Hyfryd, near Beaumaris.

LARGE WOOD-ANT

(*Formica Herculanea*).

THIS, the largest of our British ants, is very common in a wood in this neighbourhood; and though an extremely interesting sketch of its habits has already appeared in SCIENCE-GOSSIP,* yet perhaps two or three more of its traits may not be unacceptable. It is much superior in size to the black, red, or yellow ants, being between a quarter and half an inch in length. Its colour is of a dark brown, but lighter on the thorax. Last September, while strolling through a wood, I derived much amusement from noticing its habits. I then observed numbers of these ants running up the stems and among the foliage of the oak bushes; and on looking more closely to ascertain the cause, I found that numbers of the ants were congregated round the large dark-coloured, wingless aphides which are commonly found on the oak-twigs in the autumn months. The youngest reader of SCIENCE-GOSSIP must have heard or read of what the ants do with the aphides—how the ant pats the side of the aphis with its antennæ, and makes it exude a drop of honey-dew, which the former eagerly licks up. The ants of which I am speaking were thus engaged, busily elbowing their way among their fellows, and persistently tapping the aphides. One large and corpulent aphis resented this familiarity by kicking out its hinder legs vigorously whenever an ant approached, and thus kept the honey-dew-loving Formicidæ at a respectful distance. I suspect that not only are the aphides plundered by the ants, but are also occasionally devoured, for I noticed one of the ants seize a small aphis, and very unceremoniously carry it off. Perhaps, however, it was merely taken to the nest to afford further rich treats. These ants are very pugnacious among themselves, and I noticed two engaged in a desperate pugilistic encounter on an oak-gall. This ant is also of a fierce and fearless disposition to enemies greatly superior to itself in size. On presenting a finger to one of them, it immediately placed itself in

* Vol. ii. p. 150.

a defensive posture by sitting on end, elevating its fore-feet in a threatening manner, and making strenuous efforts to seize the finger, which was not, however, permitted; so that, practically speaking, I did not become acquainted with its ferocity. The ants having satisfied their appetites, took a very lazy way of reaching the ground; for instead of descending in the usual way, they dropped from leaf to leaf, and thus reached *terra firma*. Yesterday (May 16) I had another excellent opportunity of watching the habits of the Wood-ant. On the path running through a wood were a large number of these ants hurrying about with great activity; some going in one direction, others in another. Ever anxious to add to my imperfect knowledge of natural history, I stopped and watched them for a long time. In a very short time I had noticed that this army of ants was somewhat unequally divided into two parties—one party proceeding to the right, the other to the left. I also discovered that those marching to the right were all laden with provisions, and pushed forward with alacrity; while those going to the left were empty-handed (if I may so express it), and instead of marching straightforward, were proceeding slowly, and hunting over every inch of ground and every blade of grass. The ants going to the right were, as I said before, laden with provisions, and it needed no prophet to tell me that the nest lay in that direction. Wishing to have an opportunity of examining a nest, I was about to push forward with that intention, when happening to look up, my eyes rested on one of those terrible "Take Notices" which menace the reader with all the terrors of the law if he should dare to place his trespassing foot out of the legal six-inch path. Having a great respect for the law, I forbore gratifying my curiosity, and therefore turned my attention to the nature of the provisions carried by the industrious ants. I found them to be dead flies of different kinds, bits of the *exuviæ* or cast-off skins of other insects, and three or four were busily lugging to the right the carcass of a small bee. Then several—I may say dozens—had small caterpillars of the leaf-rolling moths (*Tortrices*) in their mouths, and others were carrying along dead, or parts of dead, comrades. Thus we see that the little leaf-rolling caterpillar has other enemies besides birds to fear, and though it may often escape the bill of the bird by rolling out of its tubular dwelling and dropping to the ground by its silken thread, yet it is still in danger of being seized as lawful spoil by some ferocious *Formica Herculanea*, and dragged off to the fir-leaf nest. But what shall we say respecting the dead and mutilated comrades? How shall we explain it? Is it possible that the defunct ants had succumbed to the cold May breezes (what an anomaly) so prevalent here the last few days? No, I should scarcely think it probable, seeing that these ants are able to abide the frosts of winter, and come forth again in March or April none the worse for their sharp experience. I tremble to bring such an awful charge against the *Formica Herculanea;* but I reluctantly believe him to be not only an humble professor of the "noble art of self-defence," with its concomitants of fierce blows and sudden abridgements of life, but, alas for the poetical associations of ant-dom! a cannibal into the bargain. A last gleam of hope. Perhaps the ants were about to remove their dead comrades to the family mausoleum, previously securing the services of that ritualistic-looking undertaker the Burying-beetle, and likewise engaging the most plaintive nightingales in the neighbourhood to wail solemn requiems to the memory of the departed—pugilist. How romantic.

William Henry Warner.
Kingston, Abingdon.

A NEW BRITISH MOSS

(*Thuidium decipiens*, De Notaris).

In the spring of 1868 I discovered a moss growing abundantly by the side of a streamlet, and about springs on the Clova mountains. It had the aspect of a cross between *Hypnum commutatum* and *Hylocomium umbratum*, but seemed not only different from these, but from all other British mosses. On this account it was immediately sent to the late Mr. Wilson, who, if I remember rightly, declared it to be a form of *Hypnum commutatum*. With this decision I was satisfied at the time, but upon a re-examination of the moss early in 1870, I came to the conclusion that it was clearly different from any British, European, or American species described in Wilson's "Bryologia Britannica," Schimper's "Synopsis," or Grey's "Manual." Accordingly I issued it as a new species under the name *Hypnum rigidulum*. Mr. Wilson, on his attention being re-directed to it, finally pronounced it to be a form of *Hypnum falcatum*, Bridel; and, with one exception, all the other bryologists to whom I sent it, some of whom were of the highest standing in this country and on the continent, regarded it as only a form of *Hypnum commutatum*. The influence of such authority was so great, that I was very reluctantly subsiding into the general opinion, when, quite recently, Juratzka received the 23rd fascicle of Rabenhorst's "Bryotheca Europæa," containing specimens of *Thuidium decipiens* of Notaris. These he compared with the specimens of *Hypnum rigidulum*, and found the two identical in all particulars. This interesting moss seems to have been first gathered, but in a barren state (like our own), in Finnmark, by Ritter von Frauenfeld, in 1863; but, though distributed by him at the time, was not recognized as an independent species distinct from *Hypnum commutatum*. It was afterwards, but in what year I do not know, discovered in Italy, I

believe, ripening its fruit, not in early summer, like *Hypnum commutatum*, but late in autumn; and its specific character was recognized by De Notaris, who attached to it a very appropriate name. I have neither seen fruit, nor a description of fruit; but, even in a barren state, *Thuidium decipiens* is abundantly distinct from *Hypnum commutatum*, as the following description shows:—Stems *villous, rigid, suberect* or ascending, 2 to 4 inches long, with 2 to 4 slightly arcuate *innovations* which are irregularly pinnate; branches short, attenuate, also villous; stem-leaves *distant, widely spreading* or *subsquarrose*, distinctly revealing the luxuriant foliose villi, tortuous when dry, concave, *broadly deltoid-ovate, suddenly acuminate, auricled* at the base, serrate, strongly plicate, *papillose on both sides*, sometimes secund towards the top of the stem, but never circinate; branch-leaves much smaller, more crowded, less plicate, spreading every way or secund, ovate or ovate-lanceolate; nerve single, generally dissolving near the apex, sometimes ceasing halfway; areolæ rather large, *oval-elongate*, somewhat confused in the upper part, suddenly *much enlarged, elongate-hexagonal* and *pellucid* at the base; villi very luxuriant, life-like, reticulate, denticulate, lanceolate; inflorescence dioicous; colour dull green. On the Clova mountains *Thuidium decipiens* occurs at an elevation of about 2,800 feet, and is associated with Webera Breidleri, another new British moss, with Oncophorus virens, and a large brownish-yellow form of Hypnum callichroum, exceedingly like Hypnum Bambergeri. Within five minutes' walk of this we have gathered such rare and interesting plants as Hypnum subsulcatum, Hypnum Muhlenbeckii, Buxbaumia aphylla, Barbula Drummondii, Grimmia robusta, Cinclidium stygium, Dissodon splachnoides, Dicranum longifolium, Distichum inclinatum, Innium cinclidioides, Splachnum vasculosum, Catascopium amblyodon, Bartramia seriata, and Bryum Duvalii. A second station for this moss was discovered by Mr. Sim and myself near Auchinblae, Kincardineshire, at an altitude of about 800 feet. There its associates were Innium cinclidioides, Innium affine, var. rugicum, Cinclidium stygium, Brachytheeum Mildeanum, Hypnum vernicosum. It probably occurs in many parts of the country.

Rev. J. Fergusson.

RATS.

HAVING for years past been greatly annoyed with the ravages of rats, I have had great opportunity of noticing some (as it appears to me) remarkable signs of sagacity in them, many of which seem rather perplexing. It is truly surprising to see how, in a single night, they have eaten large holes through doors and partitions of a very substantial character. Of course, when we consider the formation of their teeth, all cause for wonder disappears. But what perplexes me is this, in each instance where the doors are well repaired and lined with sheet iron, the wood was never touched, although the iron was on the outer or opposite side of the door to the rats, and certainly could not even be seen by them. Still they would make their way through brick-work, making sad havoc with the drains. To put a stop to this, we had *pipe* drains put down, which are proof to the assaults of their teeth; but they would manage to travel about the place, making their runs through these pipes; and if there was a run of 100 yards, a broken pipe cemented (so as to keep the water out), or in fact any place *only* protected by cement, they found it out, and if the aperture could be made large enough, were soon through, making us aware of the fact by the water pouring out. In one run which troubled us a good deal, we tried all sorts of manœuvres,—broken glass put in with the mortar, and sharp stones, but all to no purpose. At length, by filling the hole well with tow and tar well rammed in, we kept them out entirely. The manner in which they committed their depredations was often rather puzzling. For instance they used to make havoc with our flasks of oil; and supposing that they managed this by throwing the flasks over, we (on getting a fresh supply) packed them tightly on a shelf, so that it was impossible for them to be upset; we found, however, one morning that our old enemies had been at work again. They had eaten away the skin which covers the top of the flask, drawn out the cotton wool, with which the neck is always filled, and abstracted some of the oil; not an easy task one would think, when the size and formation of the animal, and the long neck and comparatively small aperture of the flask, are considered. We sometimes trapped them, but we had the utmost of our ingenuity often taxed to effect this. At times they would nibble away the bait most dexterously without the spring being touched; at other times, put which bait we would, we could not get them near it. We found the large square wire traps best as a rule; we also tried a trap made of tolerably large pieces of stone, the entrance to which was by an opening at the top, and a tolerably heavy piece of stone or a brick propped over it by means of a piece of stick, at the base of which was the bait, which, if touched, brought the brick or stone down, quite closing the aperture, and if the depredator was inside, placing him in durance vile. But they managed to thwart and vex us, for we found the *stone down*, but the bait and thief both gone. This occurred repeatedly, and could only have been effected by the animal holding up the stone by its back, drawing out the bait with its fore-feet, letting the stone gradually fall, and quickly slipping backwards to escape it. A friend of mine missed some eggs out of the hen-house, and as this was repeated rather frequently, he placed himself on watch, when he

soon found the thieves to be rats. He saw one rat carrying an egg in his fore-paws, and being dragged along backwards by another rat. I was mentioning this to a friend just lately, who said he had seen a similar occurrence. It is probable I may now have said quite enough; at all events, my opportunities for studying the peculiarities of these creatures seem to be over, for, their numbers continuing to increase, and their destructiveness being almost unbearable, we introduced a cat, and, most curiously, we have seen or heard nothing of our old acquaintances since. W. C. H.

HISTOLOGY.

PROFESSOR ALLAN THOMSON, in his opening address in the Biological Section of the British Association, said:—"I need scarcely remind those present that it was only within a few years before the foundation of the British Association that the suggestions of Lister in regard to the construction of achromatic lenses brought the compound microscope into such a state of improvement as caused it to be restored, as I might say, to the place which the more imperfect instrument had lost in the previous century. The result of this restoration became apparent in the foundation of a new era in the knowledge of the minute characters of textureal structure, under the joint guidance of R. Brown and Ehrenberg, so as at last to have entitled this branch of inquiry to its designation, by Mr. Huxley, of the exhaustive investigation of structural elements. All who hear me are fully aware of the influence which, from 1838 onwards, the researches of Schwann and Schleiden exerted on the progress of Histology and the views of anatomists and physiologists as to the structure and development of the textures, and the prodigious increase which followed in varied microscopic observations. It is not for me here even to allude to the steps of that rapid progress by which a new branch of anatomical science has been created; nor can I venture to enter upon any of the interesting questions presented by this department of the microscopic anatomy; nor attempt to discuss any of those possessing so much interest at the present moment; such as the nature of the organized cell or the properties of protoplasm. I would only remark that it is now very generally admitted that the cell-wall (as Schwann indeed himself pointed out) is not a source of new production, though still capable of considerable structural change after the time of its first formation. The nucleus has also lost some of the importance attached to it by Schwann and his earlier followers, as an essential constituent of the cell, while the protoplasm of the cell remains in undisputed possession of the field as the more immediate seat of the phenomena of growth and organization, and of the contractable property which forms so remarkable a feature of their substance. I cordially agree with much of what Mr. Huxley wrote on this subject in 1853 and 1869. The term physical basis of life may perhaps be in some trifling respect objectionable, but I look upon the recognition of protoplasm, as a general term indicating that part of the tissue of plants and animals which is the constant seat of the growing and moving powers, as a most important step in the recent progress of histology. To Haechel the fuller history of this in lowest forms is due. To Dr. Beale we owe the fullest investigation of these properties by the use of magnifying powers beyond any that had previously been known, and the successful employment of reagents which appear to mark out its distinction from the other elements of the textures. I may remark, however, in passing, that I am inclined to regard contractile protoplasm, whether vegetable or animal, as in no instance entirely amorphous or homogeneous, but rather as always presenting some minute molecular structure which distinguishes it from parts of glassy clearness. Admitting that the form it assumes is not necessarily that of a regular cell, and may be various and irregular in a few exceptional instances, I am not on that account disposed to give up definite structure as one of the universal characteristics of organization in living bodies. I would also suggest that the terms formative and nonformative, or some others, should be substituted for those of living and dead, employed by Dr. Beale to distinguish the protoplasm from the cell-wall or its derivation, as those terms are liable to introduce confusion."

WHITE VARIETIES.

WHATEVER may be the primary cause of albinism, there can be no doubt but that it becomes hereditary. The white varieties of wild plants are probably propagated by seed as readily as those which receive the care of the floriculturist.

Not long since I observed an extensive thickly-set patch of the common thistle (*Carduus arvensis*), var. *flore albo*, occupying the grassy border of a chalky road, and fringing it for about 60 feet of its length. Every plant bore white blossoms, and not a coloured head was to be seen amongst many hundred individuals, except in the front and rear of the line, where the blue cockades of the typical form began to be intermingled with the white brigade. As there was apparently nothing in the plot of ground occupied by these plants different from that in the vicinity, it cannot be that they were all due to accidental contemporary variation; but they must have been the result of a previous seeding. White varieties of thistles and other species are common in the district, which lies on the chalk. I think I have noticed albinism to occur more frequently in a calcareous soil than elsewhere. R. B. S.

ON THE FOSSIL PLANT KNOWN AS CALAMITE.

IT may be of interest to the readers of SCIENCE-GOSSIP to learn a little relative to the structure of some of the plants that flourished during the coal formation.

In opening the subject to my readers I shall begin by describing the structure of a plant known to geologists as the Calamite.

This plant is looked upon by the generality of geologists as a slender-jointed reed-like plant; the outside of which was fluted like the columns of some of the ancient temples, and the specimens shown to us in proof of this are the flattened *shaly* or rounded sandstone casts of the plant preserved in most of our public museums. So far as the plant having a jointed stem, the idea is correct (and in this feature it resembles the horse-tails of the present day; some geologists asserting that the two plants are very close relations). My own observations in investigating the structure of the Calamite bear me out in saying that it was not a slender plant with a fluted exterior, but that it possessed a strong woody cylinder, with a bark forming a regular smooth outer surface, and that those specimens shown to us in our museums as the form of the Calamite, are but the casts of the inside (not the outside) of the plant.

Being favourably situated for collecting these fossil plants showing structure, and having been engaged in collecting them for more than seven years, I am now in possession of a great variety of known and unknown forms. I have been particularly fortunate in finding specimens of the Calamites showing their structure, in some cases as perfect as when living. Being able also to cut and grind down my own specimens, I think I may say that I have literally dissected the plant we have under notice.

The sketches are from specimens in my own cabinet, and will illustrate the internal structure of a few of this tribe of plants. Fig. 107 shows a transverse section of a Calamite, with its cortical layer surrounding the cylinder of woody wedges; the stem seems as perfect as when living; not a cell or vessel is displaced. It will be seen that at the point of each woody wedge there is a rather large orifice or canal; this canal is found to traverse the whole length of each wedge between the *nodes* or joints of the plant. The structure of the tissue immediately around this canal is scalariform, and would seem to point to its cryptogamic relationship; but as you get further into the woody wedge, the structure gets more like that of the Dictyoxylons, the vessels being reticulated.* Fig. 108 represents a vertical section of the same plant cut through the node, and it will be seen from this sketch that the cellular tissue filling the spaces between the woody wedges, and also filling a portion of the axis, does not cross the axis, except at the node (this is a feature to be found in the present equisetums). This cellular tissue assumes

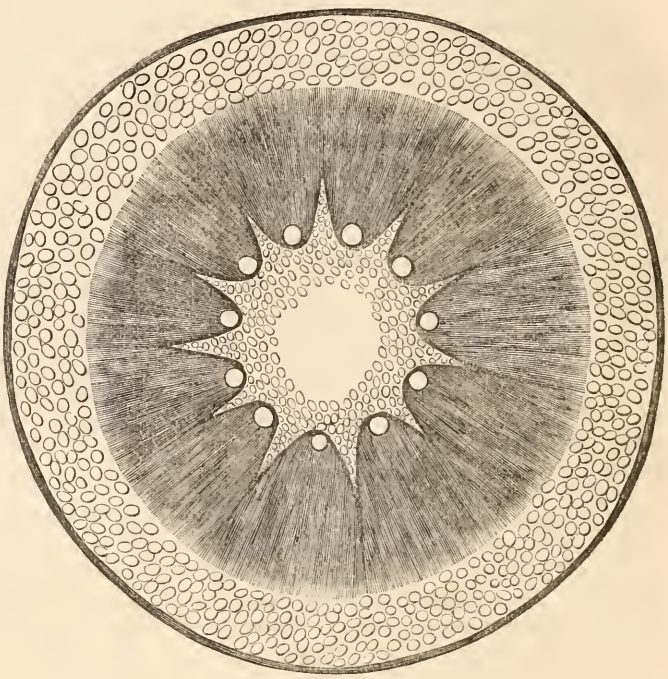


Fig. 107.

different forms in different plants: in some they are nearly circular, in others of a hexagonal form, and in others they are of an oblong form, in some cases stretching from one woody wedge to another, as shown in fig. 111. In a vertical section of the cellular tissue they are seen sometimes very much elongated, not unlike a vessel divided at intervals transversely; sometimes they assume a fusiform character. By referring to fig. 109, being a tangental section of the woody cylinder taken at the

* I have seen Calamites with nothing but scalariform vessels forming the woody wedges; so that the above must have been a higher type of Calamite than the one here referred to.

node, it will be seen that the woody wedges do not continue uninterrupted the whole length of the plant, but that they divide at each node; one half goes to the right, and one half to the left, to form the next wedge above the node. This arrangement

vessels are cut nearly transversely at the node, and so give rise to the appearance of the vessels at *a*, fig. 108.

It has been both affirmed and denied by fossil botanists that this plant possessed medullary rays;

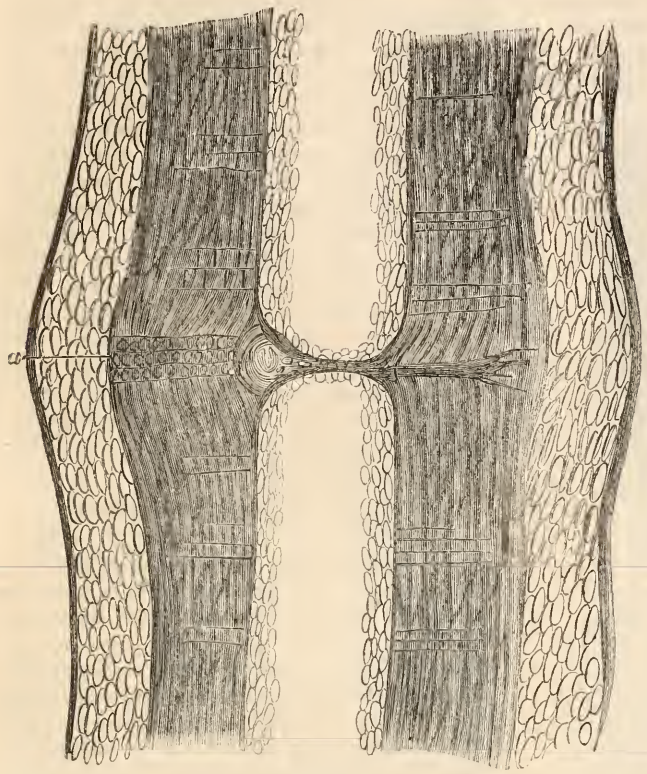


Fig. 108.

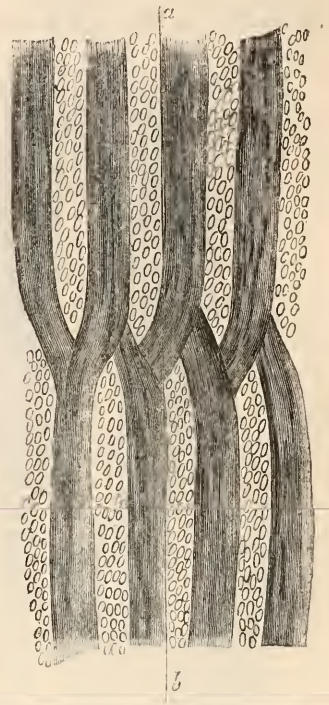


Fig. 109.

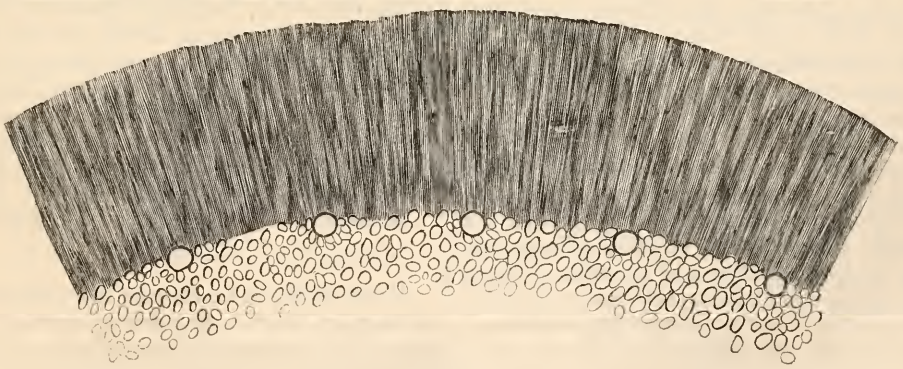


Fig. 110.

of the vessels, as seen in the tangental section, gives the peculiar form the vessels assume as seen at the node in the vertical section, fig. 108. Suppose a vertical section is cut as represented by the line *a*, *b*, drawn through fig. 109, it will be seen that the

many of my sections seem to prove the question beyond doubt (see fig. 108). The distinguishing feature of this tribe of plants has been the presence of the canal at the point of each woody wedge: I have specimens in my cabinet which show a depar-

ture from this rule, for the wedge runs off to a fine point, and no appearance of the canal is to be seen (see fig. 111). In another specimen the canals are seen at regular intervals, but no woody wedges whatever; it has one continuous vascular cylinder, as seen in the Dadoxylons (see fig. 110). In some plants the woody wedges are very numerous, with a very thin cellular tract between them; in others the wedges are few, with a broad cellular tract

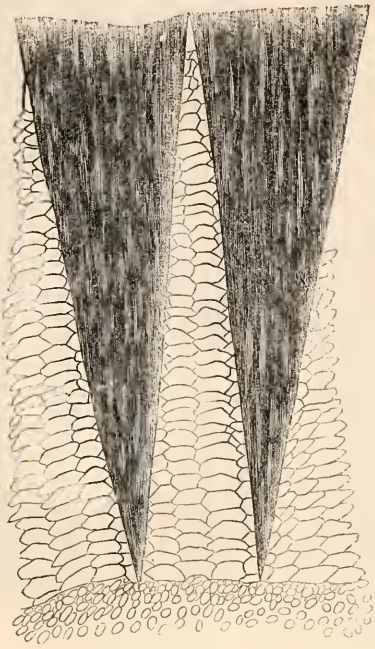


Fig. 111.

extending to the bark; this difference in individual plants shows a great tendency to variation. The bark of the Calamite is very delicate, and explains the reason why so few plants are found with traces of the bark.

A memoir has lately been read before the Royal Society by Prof. Williamson on Calamitea; the subject is anything but exhausted, and we may look forward with interest to the publication of this memoir. If circumstances permit, I will send, from time to time, descriptions of the different known fossil plants that I have met with in our coal seams.

JOHN BUTTERWORTH.

Goats Shaw, near Oldham.

PROTECTIVE MIMICRY.

THERE has been much written of late on the subject of "protective mimicry," but the most striking examples have been taken from exotic species. A practical illustration of the working of the same principle nearer home has recently occurred in my experience, and is perhaps worth recording. If to outwit man be a proof of higher art than to deceive birds, then the mimicry displayed by some of our native species will compare advantageously with the cases described by Wallace and Bates. A few weeks ago, on a bright July day, while sauntering along a Cambridgeshire lane, I espied what appeared to be a very fine individual of the wasp tribe sunning itself on the leaf of a sallow. With this impression I should certainly have declined a closer acquaintanceship, but having a friend who is on somewhat intimate terms with the Hymenoptera, I felt a vicarious interest in the creature, and determined to attempt its capture. Remembering the provincial rhyme of the "harnet" that "sat on a hollow tree," and what "a proper spiteful twoad was he," I proceeded with caution. The warlike insect showed no signs of fear at my nearer approach, but significantly clapped its hand on its sword, or, to speak less metaphorically, kept raising its abdomen and elongating the anal segments, as is the fashion among wasps, so unpleasantly suggestive of a sharp weapon ready to be drawn from its gilded sheath to resent affront—

> "Et sæpe attollunt humeris, et corpora bello
> Objectant."

Being destitute of any entomologieal apparatus, I had recourse to the simple expedient of trying to envelop it in my pocket-handkerchief, which was easily accomplished. On arriving home, my prisoner presented a strangely worn, shabby appearance, and exhibited a mildness of demeanour which caused me to examine him more narrowly, and I then discovered how thoroughly I had mistaken his name and maligned his nature. I had unwittingly caught a very harmless and rather rare moth, one of the Clear-wings, *Trochilium* (*Sphecia*) *crabroniforme*. I will only remark further, that the close resemblance of this species to a hornet, as indicated by its specific name, is not confined to mere outside show, but extends to its deportment. It acts in character, the threatening movements of the abdomen exactly mimicking those of the restless, irritable "tails" of the Vespidæ proper.

Manchester. R. B. S.

HAIRS OF SUNDEW.—At page 212 of SCIENCE-GOSSIP, for 1870, "W. W." desires to be informed how he can prepare the beautiful glands on the leaves of *Drosera rotundifolia*, so well figured and described at page 111 of the same volume. I beg to inform him that I have succeeded in preparing the glands to show the spiral vessels, by soaking in ordinary glycerine a few days, which extracts the colouring matter; and should he desire to preserve them permanently, mount in glycerine jelly.—*J. Maughan, Barnard Castle.*

MARKINGS OF THE PODURA SCALE.

SUCH a question as this, that we all thought was long since a settled one, makes it seem curious to have it asked at the present time. This, however, is not the case; for those who have read the recent controversy between Dr. Piggott and Mr. Wenham must again, in order to satisfy themselves, re-investigate the subject, so as to determine whether we are to accept the old !!! markings or the new "beaded" ones as the true markings on the scale. Without determining which is right or wrong, I beg to submit the following twelve different appearances of the scale of the Podura, obtained under every phase of oblique light, as far as I could manage it. I shall now proceed to explain how these results were obtained, and leave

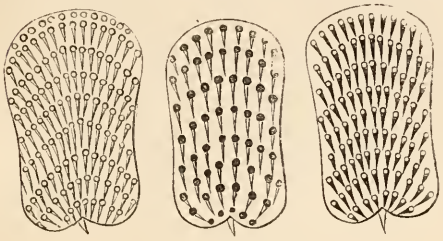


Fig. 112. Fig. 113. Fig. 114.

the rest in the hands of those who care to experimentalize on this object, and hence determine the truth for themselves. Previously to making my examination of the Podura scale, I did not feel content with having the object mounted with thin glass, as I know false appearances are often obtained by the glare from the cover when careful

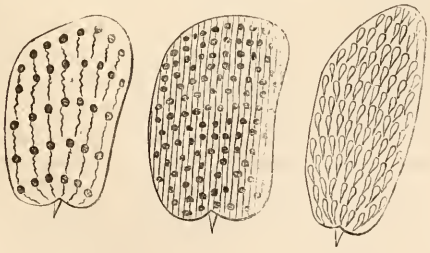


Fig. 115, Fig. 116. Fig. 117.

adjustment of the screw-collar of the objective is omitted to be made. I therefore obtained a fine specimen of the Podura, from which, by letting the insect hop about on a piece of velvet and knock itself against a thin glass slide which I held over it, I obtained a nice supply of scales, not too thickly placed on the slide. I then proceeded to examine this as a dry object, uncovered, under my large Ross A 1 microscope, using an A eye-piece, 1-16th objective, made by Powell & Lealand, London, illuminating the scale with Ross's 4-10th achromatic condenser, having 109° aperture, B stop and the concave mirror. These were the means by which I obtained the various markings, which I have roughly sketched and enclosed with this paper

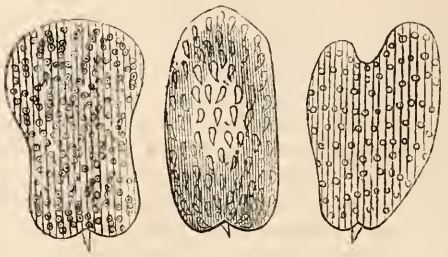


Fig. 118. Fig. 119. Fig. 120.

—considering it may be useful at the present time, as the insects are just now abundant, and ready to supply any one who requires it with fine specimens of scales. I conceive these varied figures are the result of peculiar incidences of light upon the object; but still they are interesting, as they show the various effects producible by the play of light

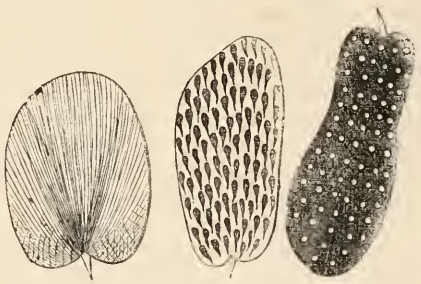


Fig. 121. Fig. 122. Fig. 123.

on such refractive objects. The following is a summary for reference to each scale as it is numbered. Fig. 112 had the light thrown from the left-hand side of the mirror, at an angle of 45°. Fig. 113 had the mirror somewhat more slanted. Fig. 114, light thrown up direct. Fig. 115, light more oblique. Fig. 116, upright scale under same conditions. The rest of the scales were more or less similarly treated, but were lying in various planes to the direction of the oblique light. It was no matter how I "rotated" the scale or changed the mirror, some one of these markings always appeared. I finally took away the condenser, and then my old friends the !!! markings returned from their hiding-place, painfully evident; nor could I with the mirror illumination, though I tried very many ways, resolve the "bulk" of the scales into the new forms which I had obtained by the use of the condenser. In conclusion, I must add, that my investigations were made by night, with a Bel-

montine reading-lamp, and also with the bull's-eye condenser, arranged to throw its rays on the mirror. RALPH H. WESTROPP, B.A., T.C.D.

Attyflin Park.

WINDHOVERING.

I HAVE been reading lately the "Reign of Law" by the Duke of Argyll, and in the chapter on the machinery of flight of birds, felt greatly delighted with the observations and suggestions. There cannot, I should think, be a doubt that the explanations given by him are correct and true —that just as a man, in swimming, advances on the sides of a wedge of water by approximating his legs, so a bird progresses, in flying, by squeezing backwards the wedge of air embraced by every beat of the wings, the feathers being so arranged, that motion forward must be the necessary result of every stroke, without any special effort on the part of the bird; but when his Grace goes on to describe the wonderful power of windhovering possessed by some birds, although I do think his exposition good, I believe it is a power given to a much greater number of birds than he supposes. "No bird can exercise this power which is not provided with wings large enough, long enough, and powerful enough, to sustain its weight with ease, and without violent exertion." "Birds with superabundant sustaining power, and long sharp wings, have nothing to do but to diminish the length of stroke, and direct it off the perpendicular at such an angle as will bring all the forces bearing upon their body to an exact balance, and they will then remain stationary at a fixed point in the air." From the remaining context I am led to suppose his Grace believes that only birds with long sharp wings—those with the first or second primary feathers longest—are invested with this power; but the Whinchat is a capital windhoverer, and so are the Whitethroat and Wagtail. I have seen the Spotted Flycatcher perform the evolutions, and lately, to my great delight, a Blackbird, in its efforts to catch a humble bee—a chase that lasted, perhaps, a minute. If all these round-winged birds can, on occasion, perform this trick of flight, the thought is naturally suggested, why may not every bird, whose time is chiefly spent in the air, possess this power, if it choose to exercise it; for has not God given to all birds of this class a superabundant sustaining beat of wing? Let us take the birds above mentioned and compare their measurements with those of the Kestrel, the *beau ideal* of a hoverer. The length of the Whinchat is 5 inches, the stretch of wings 9¼ inches; the Whitethroat, length 5½ inches, stretch of wings 8½ inches; the Wagtail, length 7½ inches, stretch of wings 12 inches; the Spotted Flycatcher, length 5½ inches, stretch of wings 9 inches; the Blackbird, length 10½ inches, stretch of wings 16 inches; the Kestrel, length 15 inches, stretch of wings 27 inches. Now, if mere stretch of wing would decide this matter, we should, *à priori*, suppose that the Whinchat would be a better windhoverer than the Kestrel, and that most probably the Blackbird could not hover at all; but as such is not the fact, it behoves us to search for a further reason for the exercise of this power than that given by the Duke; and I would suggest that the expanded tail is the chief agent. When the Kestrel is searching a district, his body appears almost upright, his tail spread to the utmost and bent forwards, and his wings half-shut and quivering. Whether it has the power of altering the position of the secondary feathers with every beat of the wing, I know not; but certainly the upright position of the body would make a large part of every wave of air created by the wing-stroke beat against the expanded tail, and neutralize, to the necessary extent, the forward motion of the remainder of the wave passing backwards. I cannot, therefore, but believe, that almost any bird strong on the wing, and with a good tail, could windhover if it liked, or if it were necessary for the successful search after daily food.

JOSEPH DREW.

CORNISH SUCKER.

AS far as the experience of three years will allow me to judge, I should say that the *Lepidogaster cornubiensis* is decidedly a rare fish, although, as we might suppose from its name, it may be found more frequently in Cornwall than elsewhere. Doubtless, like most other fishes, it moves about in shoals; for when one is found it will not be necessary to search very far for a second specimen. This fact was particularly impressed upon me two summers ago, at Halleine, the beach of the village of Trenarven; for on that occasion it would have been easy to have filled a large basket in a very short time with these strange little fishes, as almost every stone covered one, two, or more of them. I have often, since then, visited the same beach and turned over and over the same stones, but always unsuccessfully. I caught and compared about a dozen altogether, and found them about the same size—one perhaps appeared plumper than another, and the eyes of one larger than the eyes of another, and the sucking-disks formed by the pectoral and ventral fins were larger in some than others; but the length was almost uniformly the same,—about two inches: so that, doubtless, they were all of the same age. My friend and I got a great deal of amusement out of our catch by making them adhere in all sorts of comical positions; and those of my readers who have ever seen one of these odd-looking creatures will quite comprehend the possibility of our mirth. JOSEPH DREW.

ZOOLOGY.

Good Little Robin.—A little redbreast has come to our door all through the winter for his meals, and a most friendly welcome guest he has been. One spring morning we saw robin do a deed of charity that more than ever endeared the little bird to our hearts. It had been a bitterly cold night; and, on our servant going down-stairs to fetch some coal to light the fires, she found a poor little starling shivering and frightened in the cellar. She called me to see the bird; it had only just left the nest, and was so weak that it could not fly. I tried to coax it to eat, took it near the fire, offered it bread-crumbs, seeds, water; but no! the starling would *not* be tempted. Breakfast-time came, and with it the little robin. We thought if we put the wee birdie out of doors, its mother might come to look for her lost child; then came the fear of robin —he was *so very* pugnacious; well, we risked it, keeping a very strict watch over the starling's safety. Robin eyed it a moment and flew away; still the little baby bird stood on one leg shivering, and no mother arrived. The moments seemed hours. Presently robin came flying back, and with something in his beak too. Hop, hop, he came to where the wee baby starling was shivering, and popped a worm in its beak, which it opened, just as if robin had said "Open your mouth, here is some breakfast;" and away he flew, and again returned with some food to the young bird, and then they both flew away. We never saw the starling again, but good little robin's deed made him more loved than ever in the house.—*Barbara Wallace Fyfe.*

Hawk at Fault.—The following incident that befell a lady friend of mine residing at Bromley, Kent, may interest some of your readers. Their house stands on an eminence, facing a thick copse or plantation. One afternoon, as my friend was taking a nap on a sofa opposite the window in a ground-floor room (the window was of clear plate glass, and large and high, and on the wall above the sofa hung a stuffed partridge in a case), she was aroused by a terrific crash on the window, and on hurrying into the garden to seek the cause, found in the path beneath, a fine hawk nearly stunned and much hurt. It had evidently made a swoop from a great distance, at the partridge opposite the window, not perceiving the intervening glass. The sun was shining full into the room at the time. The hawk managed to flutter into the next garden, and eluded further search at the time, but the next day it was found dead under the bushes. It would have been stuffed and preserved by the side of its intended victim, but was in so crippled and damaged a condition, from the effects of its furious collision, that it was deemed only fit for burial. What a moral attaches to the story, both for birds and men!—*E. C., Ramsgate.*

Glow-worm Light (p. 69, 1870).—That it has some end useful in the insect's economy may not be doubted; but what that end is, we are entirely ignorant. It has been concluded and taken for granted, that its purpose is to direct the winged male to the wingless female. But it is surely forgotten that other insects have no difficulty in finding the males which are stationary, but that, on the contrary, they possess a peculiar power of discovering them, even when totally concealed from sight, as when enclosed in boxes, and even coming down chimneys and beating against windows, to obtain access to them; on which power the plan of taking males called "Sembling" is founded. And, whether or not, the explanation of the phenomenon would not answer in the instances where both sexes are winged.—*P. A. Gosse, "The Canadian Naturalist."*

Eggs.—Rambling along the shore of a small bay the other day, I came upon the nest of the Ringed Plover (*Charadrius Hiaticula*) with four eggs. The nest, if so it may be called, consisted of a large mound of sand, about eight inches in height, held together with some ropy fucus, and the slight depression on the top, in which the eggs were laid, was carefully and neatly paved with small fragments of cockle-shells: the nest was near high-water mark. A little farther back from the sea I found, amongst some thistles (*Cnicus palustris*), three eggs of the Oyster-catcher (*Hæmatopus ostralegus*) laid in a slight depression on the bare sand. Not far from this I came to what I suppose is merely the egg of a Peewit (*Vanellus cristatus*); but the peculiarity was that there was only one egg laid on a neat little circle of bents and rushes, which was only large enough to support this solitary egg. It was deserted, though the embryo was almost mature. In swampy ground, at the head of this little bay, I have found the nest and eggs of the Snipe (*Scolopax Gallinago*) placed on a tussock amongst the marshy herbage. There were four eggs, placed with their small ends inwards. I once, some years ago, met with the nest of the common Thrush (*Turdus musicus*) in a curious position, namely, at the foot of a small fir-tree, and quite on the ground: the nest was built in the usual way, and contained five eggs. This was in a wood, where there was every facility for building the nest in a tree. I have also discovered the nest of the Yellow-hammer (*Emberiza citrinella*) very high up in a lofty hedge: this is unusual. A pair of the Great Titmouse (*Parus major*) have built in an old unused pump here [Almorness, N.B.] for the last ten years, and maybe for longer, always bringing up two broods each season, eight in number.—*W. Douglas Robinson.*

Tortoise Eggs.—Two months ago I procured a pair of the common Land Tortoise, male and female, as I was assured. The female was the largest, and by far the more active of the two. I placed them in the flower-garden on a lawn, and on Monday last I perceived the female excavating a small hole under a hedge, using her two hind legs as spades. When she had dug a hole about five inches deep, and about six inches in diameter, she laid two hard-shelled white eggs, the size of pigeons' eggs. Then she proceeded, using only her hind legs, to shovel in the earth she had thrown out, and when the hole was full, to spread some grass over the place, so as to conceal it entirely. She laid no more eggs as far as I am aware. Since the eggs were laid under a hedge, where they could certainly obtain no warmth, I removed them to a cucumber-frame, and placed them in some fine sand, about two inches from the surface. I hope I was right in doing so. Thinking that this, to my mind, uncommon circumstance may cause some interest to your readers, I forward to you the full account of what happened.—*B. T. Guillemard.*

The Entomological Season of 1871.—One occasionally sees in advertisements issued by insurance companies, that, amongst other inducements held forth to intending members is this, that they may join in a bonus year. There is need enough, certainly, that our entomological ranks should be recruited, for, from several causes, the sum total at the present time is not what it should be; and especially do we need to add to the number of those who are observers as well as collectors. But it would be rather delusive to announce that this is a "bonus year," when beginners would be likely to fill a good number of store boxes by way of a start. It is not, certainly, at all a good season; insects of all orders that are at all choice being difficult to obtain. The Lepidoptera, as usual, have suffered most, in consequence of the cold winds and the ungenial spring and the heavy rains of summer. That butterflies and moths are not scarcer even than they are, may be attributed to the favourable influences of the winter. Such a winter as we had in 1870-71 is more conducive to the well-being of hybernating larvæ and imagos, and to that of the dormant pupæ, than one which is wet and mild. If we had had a fair average summer, many rare species would have swarmed. As it is, we have to observe as we stroll along rather discontentedly, net in hand, that "Things are bad, but they might be worse;" in fact, they are much better than in 1860, which stands out in the memory of many an entomologist as so notably unfavourable that we have since had none to equal it. One unpleasant drawback attendant upon the pursuit of insects this year has been the time required for the capture of certain species, which though "out" as the phrase goes, are certainly not "about," but must be driven from their hiding-places by diligent beating and shaking. Though a few species of our butterflies have appeared in their usual proportions, the majority are particularly scarce; and even the "Whites," those foes to the gardener, have not escaped scathless, through wind and weather. Yet with a less number than usual of those insects sought by collectors, we find, very generally, hosts of those which nobody wants or wishes to see, such as the destructive *Aphides* and *Cocci*, which evidently regard the science of meteorology with contempt.—*J. R. S. C.*

Rather Alarming!—Under ordinary circumstances, tens and hundreds of thousands, nay, millions, of eggs of tapeworms are daily discharged into our sewers. I suspect that at least 4,000 of the inhabitants of the metropolis have the honour, if you may so call it, of playing the part of host to these singular creatures, and every day one or two of the individual segments of each living tapeworm will pass to the outer world, causing 40,000 eggs to escape along with each of them. These go down the sewers, and if that sewage be collected and utilized over our fields, it follows that these hundreds of thousands of eggs will be also distributed. And what happens? The eggs, furnished with a covering which it has been stated will resist any amount of atmospheric changes, are swallowed by the cattle feeding on the grass.—*T. Spencer Cobbold, M.D., F.R.S.*

Albino Blackbirds.—A man who lives near us (Hitchin) has this year found two blackbirds' nests, each with two white birds and two black ones. He thinks that both nests belonged to the same pair of birds, as about nine weeks elapsed from the time he took the first to the time he took the second nest. He has, however, parted with all but one, which is a very fine bird, full grown, and perfectly white.—*W. Nash, Dunstable.*

Orange-tip (*A. cardamines*).—Small males of this butterfly are by no means uncommon; I have a specimen measuring $1\frac{9}{16}$ inch from tip to tip, and have seen others even smaller in various collections. I find the males of this species outnumber the females in the proportion of ten to one; and until the present season I have not taken a female since 1866. Many are, no doubt, passed for common, or Green-veined Whites (*Pieris napi* and *rapæ*); but few collectors of any experience can mistake the marbled markings on the underside, which are visible, during flight, at a considerable distance. I should like to hear the opinions of other entomologists on this subject. The Green-veined White (*Pieris napi*) is also subject to great variation in size. I have captured specimens, of both sexes, measuring barely $1\frac{1}{4}$ inch, and others rather over

2 inches in expansion, in the same locality, and on the same day. My earliest date for the appearance of the Orange-tip was April 15th. A friend noticed it on the previous day, but did not succeed in capturing it. In 1869 I saw it first on April 23rd, and in 1870 on May 6th.—*John Henderson, Jun., Reading, Berks.*

Processionary Moths (p. 185).—There must be some misapprehension regarding the species which occurs at Swanage, for the true Processionary Moths are not natives of this country. The young caterpillars of several of our native species move towards their food in regular order, as for instance those of the Buff-tip (*Pygæra Bucephala*), and the Gothic (*Nœnia typica*), yet they are not true processionaries. These are not species constructing a common nest; but those which do, such as the Lackey (*Bombyx neustria*), sometimes also crawl forth in a sort of procession, yet generally disperse when they reach the twigs on which they are about to feed. I imagine that the species whose habits are noted by your correspondent is the Gold-tail (*Liparis auriflua*), tolerably well known for its urticating properties, but certainly less troublesome than the continental species referred to. Many a debate has been held on the question as to the cause of the irritation they produce, some attributing it to the hairs, others to small flakes of a cottony matter ejected by the caterpillars, and others again to the emission of a peculiar fluid.—*J. R. S. C.*

Seeking Protection.—A few days ago one of our family hearing the bright chirp of a greenfinch at a window which was closed, went towards it, and saw the little bird tapping, as if for admittance, at the glass: the window was opened, whereupon the bird flew into the room; however it seemed, having gained its object, not desirous of further investigations about the home-life of the genus Homo, and accordingly, taking advantage of an open door and adjoining open window, it flew again into outer air. We fancy it must have been frightened by the pursuit of some bird of prey, and, *inter spem curamque*, in its terror tried to find a grain of compassion amongst men.—*W. Douglas Robinson, Kirkennan, Dalbeattie, N.B.*

Chærocampa Celerio.—A specimen of the Silver-striped Hawk-moth (*Chærocampa Celerio*) was caught at Southport last Monday, July 17th, and was sent to me. It is perfect, with the exception of the tip of one of the front wings, which is broken.—*E. Bell.*

European Birds in New Zealand.—Through the praiseworthy efforts of our local Agricultural Society, a few skylarks and sparrows have been introduced to the province of Taranaki. Vigorous European birds have become a *desideratum* here, through the rapid decrease of the feeble native birds by the depredations of the domestic cat, Norway rat, and kingfisher (*Halcyon vagans*). The Bell-bird of Captain Cook (*Anthornis melanura*), and the native robins (*Petroica*), once numerous, are now nearly extinct: you may travel for miles in the forest without seeing or hearing them. The Kingfisher, however, is increasing both in numbers and rapacity. Once he appeared to be quite harmless, contenting himself with the small fry in the forest streams, wood-boring larvæ, and the spider-crabs of the beach; now he devours young chickens, small birds, and mice.—*B. Wells, Taranaki, N.Z.*

Swallows.—In a café or coffee-shop in a village where swallows (*Hirundo rustica*) breed every year, at present there are two nests, each with young. The old birds feed the young up till sunset. One bird stays by the nest while the other is away seeking food. As soon as the seeker enters the café, by open doors or windows, on its return, the bird in waiting immediately flies off in its turn for food. Such is their regular mode, as I watched them long. After sunset the old birds cease seeking food. One of the birds sits on the young at night, and the other retires to a perch close by for the night, close to well-lighted lamps, smoking of cigars, the din and noise of numbers of people. Such is custom and confidence. These birds are very partial to building in cafés in this part. They return with food to their young very quickly—insects are abundant here.—*T. R., Ortakeny, Turkey, July* 25.

British Butterflies in India.—I have observed the following British butterflies occurring in *great abundance* upon the plains and hills of the Punjab. I have compared the Indian with some English specimens, and, except in two instances, have found the markings and colourings exactly similar. The Swallow-tail (*Papilio Machaon*), the Brimstone (*Gonepterix rhamni*), the Clouded Yellow (*Colias hyale*), the Black-veined (*Aporia crataegi*), the Large Garden White (*Pieris brassicæ*), the Small Garden White (*Pieris rapæ*), the Painted Lady (*Cynthia cardui*), the Large Tortoiseshell (*Vanessa polychloros*), the Small Tortoiseshell (*Vanessa urticæ*), the Queen of Spain Fritillary (*Argynnis Lathonia*), the Small Copper (*Chrysophanus Phlæas*), the Azure Blue (*Polyommatus argiolus*), the Little Blue (*Polyommatus alsus*), also the Apollo (*Parnassius Apollo*) and the Long-tailed Blue (*Polyommatus bæticus*). Many species of very handsome butterflies, moths, and beetles are found here; but as we have had much rainy and cold weather since the middle of April, it has been a very bad season for the entomologist.—*Edward D. Burton, Simla, India.*

BOTANY.

Floral Stars.—We have several most beautiful wild flowers which may justly claim the name of stars, others too besides the *Stellarias*. The earliest is the Lesser Celandine (*Ranunculus ficaria*), which is certainly very handsome and *star*-like when the sun is shining upon its golden petals, generally seven or nine in number. The leaves are heart-shaped, dark green, and spotted; when the petals are closed, it is a very insignificant-looking flower, as the under side of the petals is of a dull greenish-yellow. This may be called the *star* of the meadow, although it grows frequently upon the road-side. The next is a silver *star*, the Wood Anemone (*Anemone nemorosa*), which makes the woods look brilliant in the sunshine, with its beautiful *star* flowers. It is a beautiful flower, too, when there is no sunshine to lend its fascinating charms to the wood and its bright occupants; at night, when the pink-tipped petals close over its delicate pale stamens, and bend towards the deeply-cut dark green leaves, which grow halfway up the stem (they are covered with a number of delicate silver hairs and bordered with purple), *then* the Wood Anemone might claim a place among our bell-flowers; when the cool night breezes blow its pretty drooping flower, it may be one of those which one of our poets says,—

> "Ring a merry chime that tells
> Spring is coming!"

The *Stellarias* have their *star*-like honours always appended to them, from their Latin name *Stella, a star*. The Great Stitchwort (*Stellaria Holostea*) is a beautiful fragile flower, which finds another place in which its *stars* may shine—the hedges. It is a very delicate plant; the stem is square, the leaves of a beautiful pale green, long, narrow, and slightly hairy: the plant grows from one to two feet high. When the flowers have gone out of blossom, the seeds serve instead of bonbons for the children to amuse themselves with; so that this is a well-known and much-loved plant with them. I have found it in blossom in the beginning of February, a little green branch with the blossom upon it growing out of an old brown stem, which looked perfectly dead; but seemed to become possessed of a new life when the first warm day of spring appeared, and sending forth the first *star* when all around looked cold and cheerless, and not one of its bright companions to be seen. The Chickweed (*Stellaria media*), the commonest of the *Stellarias*, is a very little *star*, often covering waste places with its mantle of green, studded with countless *stars*, bright although so small. The leaves are egg-shaped and hairy, the branches lying upon the ground. The other *Stellarias* blossom later in the year, when Summer has come, bringing with her countless flowers to cover the meadows and hedges with brightness.—*A. E.*

Furness Abbey.—Some of the readers of Science Gossip may, during this autumn, pay a visit to the Lake district, and if so, those who are interested in our wild plants will probably be induced to go a little out of their way to the picturesque ruins of Furness Abbey, where, upon the authority of the guide-books, they will expect to find the deadly Nightshade (*Atropa Belladonna*) growing in some abundance. To such I would give a word of advice and warning. I say to them, by all means go to Furness Abbey, which is a splendid old ruin, but do not expect to find the deadly Nightshade growing wild. A single plant will be shown by the local guide (if the visitor does not previously discover it himself), carefully boarded round, and otherwise preserved from the assaults of the mischievous. But this plant, the guide assured me, he planted himself, and there are now no remnants of the Atropa growing wild on or about the ruin. The botanical visitor will, however, be pleased to observe the following plants; viz., *Parietaria officinalis* (very luxuriant), *Lactuca virosa* and *muralis*, *Sedum Telephium*, &c. The old walls are also beautifully decorated with *Campanula rotundifolia*, and a number of other more common plants. I made a list of upwards of seventy during my morning's stroll about the ruin. —*Wm. A. Clarke.*

Plantain.—While walking through our new park, on the west bank of the Schuylkill river, a day or two ago, I chanced to alight on what I imagine to be a very singular specimen of Plantain (*Plantago cordata*). The footstalk was about 8 inches in length, and from where the seed commenced to the point (or extremity 12 inches more; it then branched off into *three* distinct spikes of about half an inch in length, each of these spikes again branching out into other spikes—one throwing out 4, and the other two 3 spikes each. Are such specimens occasionally met with? I should be glad to know.—*George Worley, Philadelphia, U.S.*

May in August.—Whilst I was walking on the banks of the canal close to this town, I picked some hawthorn in full flower. This was on Aug. 2nd. Never having heard of or seen it flowering so late, I thought it would be of interest to your readers to notice the fact.—*James Bate, Tiverton.*

White Varieties (p. 191).—I was interested in reading the notice of White Varieties of Flowers found by your correspondent "F. I. W." near Winchester, as I have gathered in Cornwall, this summer, besides a white variety of *Thymus chamædrys* (which occurs in several places), *Jasione montana*, and *Stachys betonica*, perfectly white, growing near the "Indian Queen," on the Truro and Bodmin road.—*S. M. P.*

MICROSCOPY.

The Origin of Life.—Dr. Crace Calvert read a paper "On the Action of Heat on Germ Life." The paper described a series of experiments made by the author for the purpose of determining the effect of heat on living organisms. He took a solution of white of egg full of microscopic life, and a solution of gelatine full of microscopic life, as also solutions of sugar and hay. These solutions were put into little tubes, and submitted to temperatures of 100°, 200°, 300°, 400°, and 500° Fahr. It was found that at 100° the living organisms were not at all affected; at 200° they were not affected; at 300° they were still alive—three or four vibrios in each field; and it was only at 400° that life disappeared. The same solutions were then put on little slips of glass, dried, some in the air and some at a temperature of 212°, and introduced into tubes. As before, it was only at 400° that life disappeared. By another experiment it appeared that in a fluid where life had been destroyed by heating to 400°, no life was subsequently developed, whereas in one which had been heated to some of the lower temperatures, such development took place. If, said Dr. Calvert, there was such a thing as spontaneous generation, he could not understand why there should not have been life reproduced in his tubes which had been heated to 400°; whilst a little life was reproduced in one heated to 300°, and more in one heated to 200°. It appeared to him that medical men would do well to consider the temperature at which life was destroyed. Admitting that contagious disease was due to the introduction into the system of a germ of some kind, either vegetable or animal, so far as his experiments went, a temperature of 400° was necessary to destroy such germs on clothing to which they might have become attached.

Another paper by Dr. Calvert, "On Protoplastic Life," was next read. If, said the Doctor, the white of a fresh egg was taken and mixed with water, and examined under the microscope, not the slightest life was to be seen, but at the end of twenty minutes or half an hour, plenty of life might be discovered. In such experiments a fluid must be employed, and whatever fluid was employed, if examined under the microscope, it showed life. Common distilled water, if kept for two or three days, showed life; but after many failures, he discovered an apparatus by means of which he had been enabled to get distilled water which would keep free from life for three months. Having thus got a pure medium without life, the question was whether he could generate life in it. He introduced distilled water into twelve tubes, and left them exposed to the air for twenty four hours. It was in winter; in the summer he should have left them for ten minutes. Another series of tubes were placed near putrid meat, and then closed. Life appeared in twenty-four days in the tubes containing distilled water, which had been exposed to the air, but a portion of the same water which had not been exposed to the air showed no life. The tubes which had been placed near putrid meat showed life in eight days. The distilled water was thus impregnated with more life by being placed near a source of putridity. Up to this point he had been using hydrogen to wash his apparatus. He replaced the hydrogen by oxygen, and found that by using water saturated with oxygen he produced life in three or four days instead of eight days. Then taking water into which a little albumen had been allowed to run without being exposed to the air, he found life developed in two days. The general result of the experiments was that life was produced if the fluid under examination was left exposed to the air for a very short period. If perfectly sweet eggs were covered with varnish they would keep for eighteen months, while if not so covered they would not keep as many weeks. But if there was such a thing as spontaneous generation, why should not the egg covered with varnish decompose as soon as the other?

The new Elephant Parasite (*Idolocoris elephantis*, Walker).—In reply to a notice in the last Science-Gossip, by Mr. T. G. Denny, I beg to state that the then unique specimen of this insect was placed in my hands, two years ago, by Mr. T. Curties, F.R.M.S., and I at once declared to that gentleman my belief that it was "an entirely new form of parasite." This fact disposes of the assertion of priority of discovery or possession. That the species was not published without due care and discrimination is proved by its not appearing until last June. In corroboration of my opinion as to the novelty of this parasite, I have not only the authority of Mr. F. Walker, F.L.S., but now also that of the late Mr. Denny, who, as is stated by Mr. T. G. Denny, having received some examples of it, long after it had been well known to me, considered it to be an "entirely new one." Having thus far answered Mr. T. G. Denny's rather ambiguous assertion that the species is "not altogether new," I trust he will permit me to remind him that any dispute as to the date of acquisition, or presumed intention of publication, is altogether beside the question—priority of sufficient publication, and that alone, constituting the authority of a species. I submit, therefore, that in accordance with common sense and scientific usage, the name given by Mr. F. Walker to this new form of parasite in the Science-Gossip of June 1871 must stand.—*H. C. Richter, Kensington.*

NOTES AND QUERIES.

Local Floras.—I am acquainted with the following local floras:—Hall's "Flora of Liverpool," 1838; Melville's "Flora of Harrow," 1864; Trimmer's "Flora of Norfolk," 1866; Deakin's "Flowering Plants of Tunbridge Wells and Neighbourhood." In Curtis's "Topographical History of Leicestershire" there is a list of the plants of the county.—*A. H. A.*

Local Name for Ladybird.—In the south of Lancashire I have heard the Ladybird (*Coccinella*) called a "god's horse." This is very like the French popular name, "Bête-à-Dieu."—*A. H. A.*

Wakon Bird.—About this time last year a correspondent asked what was the Wakon Bird of the North American Indians? It is a bird which they hold sacred, and call the "Bird of the Great Spirit." Some suppose that it is the same as the Bird of Paradise. (See Morse, "American Geography.")—*A. H. A.*

Anecdotes twice told.—Helen E. Watney ("H. E. W.") begs to say, in reference to a communication of "J. J.," that both the anecdotes mentioned by him as having appeared in *Country Life*, were *written by her* to that journal—she has not been guilty of cribbing. She deemed herself at liberty to mention, when writing on a like subject in Science-Gossip, the same anecdotes again. She wrote in *Country Life* as "Wah-Wah-Tay-See," and as "Firefly"; but Science-Gossip forbids a *nom de plume*. As to his remark about the "Nursemaid," she was upper nurse in "H. E. W.'s" employ, and doubtless considered herself quite "a young lady," and always spoke of her father, a London tradesman (tailor), as her "papa;" therefore "H. E. W.," in the anecdote referred to, wishing to be brief, wrote "young lady." "J. J." is, indeed, a modern "Zoilus."

Fossil Oolitic Plants (Science-Gossip for July, p. 157, figs. 76 and 77).—There appears to me a very striking resemblance between the above figures and a transverse section of the *stone* of the common date (*Phœnix dactylifera*). Perhaps Mr. J. S. Tute would compare the two, and let us know, through Science-Gossip, whether they are identical or not.—*J. Bowman, Lamplugh.*

Destruction of Earthworms and Black-beetles.—I can indorse all Mr. Henry Deacon writes as to the use of lime-water for the destruction of earthworms; but I would like to add a caution to his note. See to the strength of the preparation, should you ever need to apply it to a plant-bed, for I lost some very valuable flowers once by giving too strong a solution. Two handfuls of quicklime in a pail of water, and allowed to remain until it clears, is the right proportion—the test your own or your gardener's tongue. When the water is clear, pour it off, and if, on applying it to the tip of your tongue, it tastes strong, dilute it. The *temperature* also must be noticed, for if under 80° it will injure the roots of your plants, should they be hothouse ones. I find lime of the very greatest service in my garden, and have begun applying it already; for on entering on my present residence, I found the kitchen-garden infested with grubs; the gooseberry caterpillar has been an especial pest this season. By the way, a friend of mine has sent me what he says is an unfailing receipt for the destruction of this foe, but it cannot be applied until spring, when the first set of leaves are out. Salt is the best thing I ever tried to dislodge worms from walks; but of course it is out of the question on grass lawns. I fancy worms are beneficial helps on pasture land, and would not drive them from my field on any account; but on garden or croquet lawns they are most objectionable. A pet hedgehog will soon clear the house of black-beetles. It is a quiet little beast, eats bread-and-milk like a cat, and only wanders about at night; is particularly fond of beetles, and will very quickly destroy a colony of them.—*Helen E. Watney, Bryn Hyfryd, North Wales.*

Anthea cereus.—In August, 1869, whilst shrimping in the spring tide, I noticed a large and beautiful Actinia (the *Anthea cereus*) fastened to a long and wide frond of sweet tangle. It was further out than low-water mark, and situated between some large rocks, from one of which the lamiuaria was growing. There was just wash enough to keep the tangle in constant motion. The tentacles of the *Anthea* were every moment busy fishing in all directions, and as the creature was near the surface and the sun shining directly upon it, the beautiful colours given out in the glancing waters it would be quite impossible to describe. But my chief object in mentioning the circumstance is, to show that the power of locomotion in these flower-like animals must be pretty well developed, and doubtless is enjoyed by them to a much greater extent than is commonly supposed, from the passive condition in which they are usually discovered.—*Joseph Drew.*

Hawfinch (*Coccothraustes vulgaris*).—In Jan., 1866, I watched one of these birds for a considerable time. It was perched on a holly that grew close to the window of the room in which I was sitting, and feeding on the berries; this was near Midhurst, in Sussex. I have never seen the bird in Buckinghamshire; but last autumn, when walking in a neglected orchard, near Denham, in that county, I found the ground thickly strewn with cherrystones, which were all halved, exactly in the manner described in John's "British Birds in their Haunts," as though cut by a sharp instrument; from which I infer that this bird frequents that neighbourhood.—*M. D.*

Hawfinch (p. 184).—A friend of mine, living near Oakham, in Surrey, has a live hawfinch, which was taken from the nest in a neighbouring wood last June.—*W. R. Tate.*

The Hawfinch.—In answer to "C. A.," who invites records of the occurrence of the Hawfinch (*Coccothraustes vulgaris*), I may inform him that it is tolerably common in this part of Sussex (Uckfield), and builds every year in my own grounds—notably in an orchard.—*W. N. J.*

The Hawfinch (*Coccothraustes vulgaris*).—In reply to your correspondent "C. A.," in last month's Science-Gossip, I would venture to offer the following memoranda respecting the above bird. I have found it nesting in Gloucestershire in 1870, in the neighbourhood of Campden. It also bred near Bristol last year, and again in the same place this year. (*Field*, 1871, p. 506.) I have taken the nest in Leicestershire, some years ago, not far from Birstal, in that county. Here I may mention one of the peculiarities in the migrations of this bird, *i.e.*, large flocks will appear in a part of the country where not a single individual has been noticed for years, and when no particular feature in the season

can account for such appearance. A friend of mine has found the Hawfinch breeding in Wiltshire and Berkshire; and it was found nesting at Windsor nearly forty years ago. (Mudie's "Feathered Tribes," vol. ii. ed. 1834.) In Middlesex it has bred in almost every part. (Harting's "Birds of Middlesex," pp. 84, 85.) It has been known to nest in Richmond Park, and I have a female specimen in my possession which was shot in the neighbourhood of Kingston-on-Thames, with the bill in the deep blue leaden colour of the breeding season. In stuffed birds, however, this blue fades into yellow upon the under surface of the lower mandible. In Suffolk, as in some counties, it is permanently resident, and in the adjoining county of Norfolk it has bred at Weston, Kimberley, and Attenborough, as recorded by Mr. Stevenson. ("Birds of Norfolk," pp. 215, 216, vol. i.) Mr. Henry Doubleday's excellent contributions to ornithology have made known to many that Epping Forest may be considered to have once been the particular home of the Hawfinch. It is permanently resident there; but, unfortunately, in fast decreasing numbers, according to Mr. Doubleday. (*Zoologist*, p. 5098. See, however, another communication from the same writer in *The Zoologist* for March, 1868, p. 1133.) During the present year, 1871, the nest of the Hawfinch has been taken at Kesgrave, in Suffolk; at Kington, in Herefordshire (*Zoologist*, S.S., p. 2682); at Weobley, in the same county (*Field*, (July 8, p. 34); and at Alresford, in Essex (Dr. Bree, in *The Field*, July 8). I have known it to breed in Worcestershire, though in that county it is a rare species. Mr. Lees (*Zoologist*, S.S., p. 2637) mentions that its nest has been found at Malvern. Mr. J. H. Gurney, jun., saw the Hawfinch at Oued-el-Alleg and Miliana, in Algeria ("Ornithology of Algeria," *Ibis*, for July, 1871); and Mr. Dresser, in an interesting translation from the Russian, in *The Field*, August 12, 1871, mentions the Hawfinch as rare in the Trans-Ural.—*E. F. Peterson*, 36, *Tavistock Crescent*.

Hawfinch.—For the information of your correspondent "C. A.," in your August number, I beg to state that a couple of young Hawfinches, just fledged, were caught here on the 28th of June.—*Ernest George Hebbert, Southboro', Tunbridge Wells.*

The Oak Eggar (*Lasiocampa quercûs*). — In answer to Mr. W. H. Warner, I find my first eggar commenced spinning on May 12th. In 1869 (which was a much earlier season with us) I had a pupa on May 7th, the larva having completed its cocoon some days before. Mr. Warner does not give the exact date of his larvæ being full-fed, though he observes, "*It appears to be remarkably early.*"—*J. Henderson.*

The Small Eggar (*Eriogaster lanestris*).—In reference to the habits and peculiarities of this species, about which Mr. Laddiman seeks further information (p. 165), I beg to state that some years since I found a great mortality took place when the larvæ were reared in confinement. But in this, as in some other instances, it has been too hastily assumed that this mortality is peculiar to their life in captivity. I am rather inclined to believe that it is a delicate larva under all circumstances, and though seemingly not much troubled by insect parasites, it is kept in check by the prevalence of some disease which diminishes their numbers. Were it not for this, as the moth lays a considerable number of eggs, we should probably have it as abundant as the well-known Lackey. Since the time I reared any of the larvæ of this species, I have been told that slightly damping the cocoons is advantageous—a practice which is rarely resorted to by the entomologist in the case of those pupæ thus enclosed. It might be worth a trial. In Science-Gossip, vol. i. p. 126, is an interesting account of this moth; the author was very successful with the brood he had in rearing.—*J. R. S. C.*

The Small Eggar (*Eriogaster lanestris*).—My experiences of the larvæ of this interesting moth are similar to those of Mr. Laddiman; which fact, though known to him, may perhaps be of interest to other entomologists. In the season of 1869 I took 50 full-sized larvæ, of which only three attained the perfect state. In 1868, out of 40 larvæ, only two moths emerged, and one of these was "a cripple." What makes this so remarkable is the fact that other species are easily reared in the same box, and on the same plan, with complete success. Some other Bombyces, especially the Oak'Eggar and the Drinker (*Odonestis potatoria*), die off, but not in such large quantities, and this I can trace to the Ichneumon Fly in many cases. As I have a large brood of full-grown Small Eggars in my breeding-cages at the present time, I hope to be more successful with them; if, however, they die off, I shall endeavour to find out the cause of the "mortality," and will send on account of it to Science-Gossip. The peculiar length of time occupied by the Small Eggar in the pupa state is well known to myself and other Reading collectors of whom I have inquired. I have only had one double cocoon spun, to my recollection, and the inmates never came out. I have bred large numbers of the Puss-moth, but have always found they emerged the first season.

Folk-lore—Mad-stones.—"Five children, three white and two black, were bitten by a mad dog in Pulaski, Tenn., one day last week. Mad-stones were applied promptly to the white children, it is said, with the desired effect, all of them being now well and safe, while the negro children, to whom the mad-stone was not applied, have gone mad. The account says there were several mad-stones in the neighbourhood." The above extract is from a New York paper of last month, and it is possibly the invention of some penny-a-liner; but it would be interesting to know if there really exists in America a popular belief that certain stones have the power of averting hydrophobia from persons who have been bitten by dogs, and, if so, some account might be given of the nature and locality of such stones.—*Fras. Brent.*

Fishes of the Jordan (p. 166).—Dr. Tristram states that the species of fishes inhabiting the Sea of Galilee and the Jordan (which of course are identical) closely resemble those of the Nile. The Bream, Perch, and Carp tribes are prominently represented, together with siluroids or sheat-fish, called by Josephus *Coracini*. Dr. Tristram and his companions found *Chromis nilotica* (a bream), *Clarias macracanthus* (a siluroid), and four species of *Hemichromis*, an African genus. The quantities of these fish are described as remarkable, both in the lake and in the Jordan.—*W. H. Groser.*

Cleaning Skeletons (p. 165).—Perhaps if your correspondent L. Gillson, instead of burying his specimens, would try placing them near the ant-hill in a perforated box, as recommended by the Rev. J. G. Wood in his "Common Objects of the

Sea-shore" (chapter on star-fish), he would succeed better, as the thin bones would dry and harden rapidly above ground, so that the ants would probably be unable to destroy them.—*G. H. H.*

Local Floras (p. 163).—I forward titles of a few English local floras, extracted from one of Mr. Wheldon's catalogues, hoping that they may prove useful to Mr. Wilkinson and other intending excursionists, should we have any summer this year:—

Bristol.—"Flora Bristoliensis," by Swete, 1854.
Cambridgeshire.—"Flora," by Babbington (*sic*), 1860.
Cheltenham and Environs.—"Flora," by Buchman, 1844.
Chudleigh, Lustleigh, &c.—"Botany," by Halle, 1851.
Devon.—"Flora Devoniensis," by Jones and Kingston, 1829.
Essex, "Flora of," by Gibson, 1862.
Faversham.—"Catalogue of Plants," by Jacob, 1777.
Kent, East.—"Floral Guide," by Cowell, 1839.
Kent, South.—"Rare or Remarkable Plants," by Smith, 1829.
Isle of Wight.—"List of Plants," by Bromfield, 1840; "Flora Vectiana," 1823.
Liverpool.—"Flora," by Dickenson, 1851.
Northumberland and Durham, "Botanists' Guide through," 1807; "Botanical Guide through," by Winch (N.D.).
Nottinghamshire.—"Flora," by Howitt, 1839.
Oxfordshire.—"Flora," by Walker, 1833.
Poole and Neighbourhood.—"Botany," by Salter, 1839.
Salisbury and Environs.—"Natural History," by Maton, 1843.
Shropshire.—"Flora," by Leighton, 1841.
Tunbridge Wells, "Plants growing wild in Neighbourhood of," by Forster, 1816.
Woodford, Essex.—"Catalogue of Plants," by Warner, 1771.
Yorkshire.—"Flora," by Baines, 1840.

To these may be added Lee's "Botanical Looker-out," 1851; and Turner and Dillwyn's "Botanist's Guide through England and Wales," 1805.—*W. H. Groser, Barnsbury, N.*

Borrago (vol. vi. 165, vii. 139).—The reduplicated *r* in this word would be perfectly justified by giving up its supposed origin from the Greek *βορᾶ*, and referring it to a Latin word of later times—*burra*, short wool, flock wool. There are a great many derivations in the Roman languages belonging to this root, and I believe *borrago* is one of them. The rough hairs of the plant were probably the cause of giving it the name. This etymology appears to be in concordance with the names of our plant in other languages—*borraggine* (Ital.), *borraja* (Span.), *borragem* (Port.), *bourrache* (French), *borretsch* (Germ.). I am unable to decide whether the Arabic name *al-kahilá* (Colmeiro, "Examen de los Trabajos concernientes á la Flora hispano-lusitana," Madrid, 1870, p. 24) expresses a similar idea. (In vol. vi. p. 165, of Science-Gossip, the Italian, Spanish, and Portuguese names are incorrectly spelt.)—*A. Ernst, Caráeas, Venezuela.*

To Clean Birds.—Will you, or any of your readers, be kind enough to inform me of a receipt to clean birds' feathers? I have a case of preserved birds, which, having been standing some time with a broken glass, are now very dirty.—*S. B., Brighton.*

Squirrel *versus* Missel-Thrush.—I cannot agree with the Rev. R. Blight that the interesting occurrence which he relates in last month's Science-Gossip affords sufficient ground for finding a bill against the squirrel on the charge of so heinous a crime as "entering dwelling-houses with intent to murder;" and, as this pretty little quadruped is an especial favourite of mine, I will venture to write a few lines in its defence. Everybody is aware of the pugnacity of the missel-thrush, and its vigilance in defending the neighbourhood of its nest, which is frequently carried to such a pitch that it may be seen to drive small birds (such as finches, &c.) out of the tree which it has chosen for the purposes of incubation. Certainly these would not resort to the place with the intention of sucking its eggs. Not one hundred yards from where I write there is a missel-thrush's nest, which I generally visit once a day to see how the young ones are progressing; but, far from being "permitted to climb up the tree so as to overlook the old bird on the nest without disturbing her," I cannot approach the spot without hearing the peculiar harsh cry of this bird: and the aspect of the female is most threatening when I am at the nest, as she will occasionally swoop *close* past my face, scolding fiercely all the time. This being the case, I cannot imagine that the Rev. R. Blight's missel-thrush would show so much "pluck" from any feeling that her eggs or young were in greater danger from the squirrel than from the other visitors above mentioned, but that she was simply actuated by that strange instinct which characterizes this bird so strongly, especially during the breeding season. But, looking at the other and more important side of the question, why should the squirrel be obliged to resort to a kind of food which we know is never eaten by its relations—the rabbit, hare, dormouse, &c., in a wild state? Surely our little friend is as well able to find a sufficient supply of vegetable food as its congeners. And again, judging from the formation of the squirrel's mouth, I don't exactly see how it *could* suck eggs, even were it to visit a nest with that intention. Although I doubt the sufficiency of the evidence against the squirrel, I believe there is more ground to prefer a similar charge against the hedge-hog, which, however, would be obliged to confine its depredations to *terra firma.*—*H. C. Sargent, Penketh, near Warrington.*

Cockroaches.—From the remarks made by correspondents I was induced to try borax as a destroyer of cockroaches, but my experience (like others) has been a complete failure. A friend of mine who was for a long time sadly troubled with these vermin and also crickets, was advised to try powdered hellebore, which I suppose will be the white hellebore, *Veratrum album*, and the result he tells me has been surprising; their numbers are diminishing very rapidly, and dead carcasses may be counted by the score. The powder is to be put in their haunts, and of course needs very careful handling, being an acrid and active poison: its effect on the eyes and nose is very severe also.—*S. H. Gaskell.*

Sirex juvencus (p. 166).—I have one male and two females of this insect, which were found last autumn in Kensington Gardens, but I do not know whether it is of common occurrence here or elsewhere. Your correspondent may like to hear of its occurrence in this neighbourhood.—*R. Egerton.*

Transmission of Natural History Specimens by Post (p. 191).—The introduction of the new rates has been deferred, but will take place, the Postmaster-General says, "early in September." —*G. H. H.*

Sirex juvencus (p. 166).—In Newman's *Entomologist* for May, in answer to a correspondent concerning this insect, he says, amongst other things, "there appear to be three species inhabiting this country, and each confines itself to a single species of fir;" then follows the specific distinctions of each, with a conjecture of the probable introduction of two of them into Britain, "seeing that the trees on which they feed are not considered to be native." From the partiality of *Sirex juvencus* and its allies to the fir tribe, we may conclude that it is somewhat local in this country. The larger and fine-looking species *Sirex gigas* is, I believe, the commonest of the genus.—*G. B. E.*

Food of Spiders in Dark Cellars, &c.—Has not Dr. White furnished an answer to the query of Mr. Clifford, p. 152, by the observation of the presence of *Poduridæ* with the spiders in the coal-pit? I often find both together; and when I want small *moths*, or *Poduræ*, I search a dark unused cellar, and generally find both, and spiders too, which I suppose will make "food" of them, and probably "spin webs," as in other places, to entertain their customers.—*J. H.*

Rhagium.—Can any of your correspondents give me some particulars of the *Rhagium bifasciatum*, as I have taken several lately, but cannot find a description of them?—*J. L. C.*

Sparrows in America.—The sparrows (*Passer domesticus*) imported some two years ago from England have now become quite naturalized. Their favourite place of abode at present seems to be the public squares—portions of ground in the heart of the city, some eight or ten acres in extent, thickly planted with trees, to the trunks and branches of which are attached small wooden boxes in the shape of a modern house: in these they build and rear their young. At first they were objects of great curiosity, many "Old Country" people coming miles to look once again upon the bird so familiar in years gone by. They are carefully guarded, and well fed in winter; a heavy penalty is inflicted on those who injure them. The consequence is, they increase rapidly, and are spreading over the city—a very paradise for sparrows. They have nearly eradicated the loathsome Measuring-worm. A locust alighted on a catalpa-tree a day or so ago, when it was fiercely attacked by one of these intrepid little strangers, and notwithstanding its great strength and size and its struggles to escape, was finally vanquished and carried off by the victor. One day last week an enemy appeared in the shape of a large eagle, who, utterly regardless of consequences, killed four of our little favourites ere his career was stopped short by a ball from the rifle of a police officer.—*G. W., Philadelphia, U.S.*

The Gipsy Moth (*Liparis dispar*).—Many entomologists have bred this species in confinement, though the "domestic variety," if it may so be called, is less in size and lighter in colour than the original type. It has been supposed, for many years past, that it has entirely died out in these islands, common as it is abroad in some districts. Two captures have been recently recorded, which are of interest, as proving that the gipsy moth, though as scarce or scarcer than genuine biped gipsies, has not disappeared altogether. In a wood, called Butter Wood, about two miles from Odiham, a fine moth was captured in July, 1870; and a Scottish collector reports, that in the same year, while passing by coach near Loch Mare, a caterpiller of the species fell upon him from a tree near the road. The precise date of this is not stated, but both accounts are apparently given *bonâ fide*.—*J. R. S. C.*

"Bats flying in Sunshine."—I have a bat set up among a box of stuffed birds, which I shot about noon one bright sunshiny day near midsummer. It was not hawking flies, as described by "H. L.," page 161, but seemingly fluttering in perplexity, and it certainly perplexed me; for supposing it to be some kind of bird, its form and flight puzzled me not a little, and having secured it, I was astonished to find it a short-eared bat.—*J. H.*

The Bee Orchid.—Whilst staying at Ventnor, I.W., during the early part of June last, I observed the Bee Orchid growing very freely in a field along the cliffs, about half a mile from the town, and opposite to Steephill Castle. I was somewhat astonished, knowing it to be a rare plant, and contented myself with taking only two or three specimens, though, indeed, they might almost have been gathered in dozens, as they grew only a few feet apart from each other, in the chalky soil along the bank. Subsequently I discovered a few on St. Catherine's Down, but not nearly so many as in the first-mentioned locality. I was told by some workmen that what they termed the Spider Orchid, and which has, I believe, the petals *white* instead of *purple*, might occasionally be met with; I, however, searched for it in vain. I fear it is somewhat late in the day to send this communication now, but as it may prove a slight guide to some who may wish to obtain the plant next year, and who may chance to be in the neighbourhood, I do so, thinking on that account you may deem it worthy of insertion. —*J. S. William Durham.*

Griffithsia corallina.—There is at present (August 14th) a great quantity of this beautiful species on the beach at Bournemouth. Those of your readers who only know this plant from dried specimens, can have no idea of its beauty. When held up before a candle, or between the eye and the sun, it sparkles in a most peculiar and beautiful manner; and even when held in the hand, and the sun allowed to shine on it, it seems almost like a diamond, the peculiar jointed appearance of the frond producing a fine effect. When dried it loses much of its beauty, and, like its congener *Griffithsia setacea*, stains the paper of a pinkish hue.—*T. W.*

Ragwort.—Walking out with some friends in the neighbourhood of Douglas, Isle of Man, we met an old Manx woman, who was carrying in her hand a large piece of ragwort (*Tussilago Farfara*). We asked what she used it for, and she replied that it was to prevent her from catching infectious diseases; that when she visited any one who was ill, she always smelled at a piece of ragwort before entering the room, which preserved her from taking the complaint. She told us she had used ragwort for this purpose ever since she was a girl.—*G. H. H.*

[Ragwort is *Senecio*, why call *Tussilago* "Ragwort"?—Ed. S.-G.]

NOTICES TO CORRESPONDENTS.

J. S.—Looks like "dry rot" fungus in an imperfect state.

N.B.—The pea blight is *Erysiphe Martii*. See "Cooke's Microscopic Fungi," p. 173.

J. H.—You will find information on injurious insects in Kollar's book on the subject; a little in "Kirby and Spence's Entomology;" some papers scattered over the "Gardener's Chronicle" for many years; Harris's "Insects injurious to Vegetation:" Fitch's "Reports on Noxious Insects of the United States," &c.

R. P.—A book recently published by Lovell Reeve & Co. on "Common Insects" at about twelve shillings.

H. T.—Page's "Text-book of Geology" and Nicholson's "Manual of Zoology," we should think, would answer your purpose.

R. V. T.—The lichen is *Squamaria crassa*.

E. C. J.—Not included.

T. W.—Send insect and nest, then we may tell you.

J. B.—Not uncommon.

J. S. R.—We know nothing of exchanges beyond what is stated in the notices.

C. F. W.—White fungus, *Cystopas candidus*, No. 1564. Brown fungus, *Trichobasis suaveolens*, No. 1588.

H. J.—*Solen ensis*, and

E. C. J.—The beetle is *Apion pisi*.—*C. W.*

Mount Pleasant (name illegible).—The insect is *Sirex gigas*.—*C. W.*

J. F.—By no means uncommon.

J. D. H.—*Trichobasis cichoraceurum*.

W. M.—Inquire at Mr. C. Baker's, optician, High Holborn, for Hartnack's objectives.

C. L.—For American moth-trap, see "Entomologist's Monthly Magazine" for February, 1866.

E. DE B. M.—The stalked eggs of the Lace-wing Fly (*Chrysopa perla*).

G. S. W.—The parasitic fly is *Mesochorus splendidulus*.—*F. W.*

Miss R.—We do not know—but probably of any good dealer in natural history objects.

J. G. R. P.—Pupa of a fly; when it is "out," we will tell you the name.

FIELD NATURALISTS' CLUBS.—If secretaries of country associations of this character will send full titles with the name and address of secretary, we purpose publishing a list for the convenience of our readers.

E. M. P.—Naldire's Tablet is said to be effectual.

TOO LATE.—Correspondents should remember that the 15th is the latest date at which a communication should be sent for the current month.

EXCHANGES.

NOTICE.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

PERISTOME of *Funaria hygrometrica* (mounted to show hygrometric process); also Rose, Strawberry, and Meadow-sweet Brands, for other good mounted objects.—J. C. Hope 81, Shude Hill, Manchester.

Xenodochus carbonarius, and other fungi, for fungi, lichens, &c.—Rev. J. E. Vize, Forden, Welshpool.

FOR exchange, Canadian and American diatoms, uncleaned, for English or foreign diatomaceous earths.—Apply to A. J. Johnson, St. Thomas's Hospital.

WANTED, Imagos or Pupæ of British Lepidoptera. Will give in exchange shells, ferns, or other lepidoptera.—E. F. B., Maelog House, Beaumaris, Anglesea.

NUPHAR PUMILA, &c., for other British plants.—Richard McKay, 298, High Street, Glasgow.

BRITISH LEPIDOPTERA.—*Miniata*, *Conspicuata*, *Sponsa*, *Promissa*, *Parthenias*, *Notha*, &c., for other (rare or local) species.—H. Miller, jun., Ipswich.

PHYTEUMA SPICATUM, &c., for other rare plants.—W. H. Beeby, 41, North End, Croydon.

PHYTEUMA SPICATUM, *Vicia lutea*, *Cineraria campestris*, *Crocus vernus*, *Lathyrus Nissolia*, *Geranium pyrenaicum*, *Thesiam humifasum*, *Myosurus minimus*, &c., for exchange.—R. Payne, 12, Brook Road, Stoke Newington, N.

NOTODONTA ZIGZAG.—I shall be happy to send Ova or small Larvæ of this species to any one in want of it, on receipt of box, &c., for the purpose.—F. D. Wheeler, 2, Chester Place, St. Giles Road, Norwich.

GOOD specimen of both white and spotted Elephant Hawk-moth to exchange.—Send list of duplicates to F. Piquet, York Street, Jersey. Enclose stamp to insure reply.

PALATES OF MOLLUSCA.—Six varieties offered for good microscopic objects and stamped envelope.—**Rev. W. M. Hutton, Lezayre Vicarage, Ramsey, Isle of Man.**

ELPENOR, *Ziczac*, *Prodromaria*, *Urticæ*, *Mendica*, and other Pupæ, *Dictæa*, *Popali*, *Vinula*, *B. rubi*, and other Larvæ for Pupæ, Larvæ, or Imagos. Send list.—A. Pickard, Wolsingham, Darlington.

RARE DEVONSHIRE ALGÆ, for Northern or others.—E. W. Holmes, 2, Arundel Crescent, Plymouth.

FOR Hair of Hedgehog send stamped address to Isaac Wheatley, Malling Street, Lewes. Any microscopical object acceptable.

BRITISH PLANTS (dried) in exchange for others. Send lists to John C. Hutcheson, 8, Lansdowne Crescent, Glasgow.

BUTTERFLIES, Moths, and Beetles, offered in exchange for foreign shells, fossils, or polished stones. List given and required.—M. M., Post-office, Faversham, Kent.

POLIA-CHI, *Cloantha Solidaginis*, *Cidaria populata*, *Larentia multistrigata*, &c., for other British or allied Lepidoptera.—D. Jolliffe, Naturalists' Club, Ridge-Hill lane, Staleybridge.

CHOICE Alpine and herbaceous plants and seeds are offered; others wanted. Send lists, and stamp for lists, to D.D., Post-office, Bitterne, near Southampton.

FOSSILS wanted for microscopical material. Send lists.—W. Freeman, 165, Maxey Road, Plumstead.

WANTED, *Stratiotes aloides*, or Water-soldier, and *Subularia aquatica*, or Awlwort, for *Valisneria spiralis* or other aquatic plants.—David Mitchell, 2, Davys Yard, Foundry Street, Halifax.

BOOKS RECEIVED.

"Land and Water." Nos. 288, 289, 290, 291.

"Transactions of the Norfolk and Norwich Naturalists' Society for 1870-1." Norwich: Fletcher & Son.

"A New View of Causation." By Thomas Squire Barrett. London: Provost & Co.

"Notes on Chalcididæ." Part III.—Torymydæ and Chalcididæ. By Francis Walker, F.L.S. London: E. W. Janson.

"The Canadian Entomologist." Vol. III, No. 2. Edited by the Rev. C. J. S. Bethune, M.A.

"Monthly Microscopical Journal," for August, 1871. London: Robert Hardwicke.

"The American Naturalist." Vol. V., No. 6. For August, 1871. Salem: Peabody Academy.

"Journal of Applied Science," for August, 1871.

"The Animal World," for August, 1871.

"American Journal of Microscopy." No. 3. Chicago: Speakman & Co.

"Australian Medical Journal." No. 122. June, 1871. Melbourne: Stilwell & Knight.

"Boston Journal of Chemistry." August, 1871.

"Our Eyes, and how to take care of them." By Henry W. Williams, M.D. London: William Tegg.

"Bulletin of the Essex Institute." Vol. II. Salem, Mass.

"Annual Report of the Board of Regents of the Smithsonian Institution, for 1869." Washington, 1871.

"Appendix to Benjamin Anderson's Journey to Musadu." New York, 1870.

"Second and Third Annual Reports of the Trustees of the Peabody Academy of Science, for 1869-70." Salem, Mass.

"Fourth Report of the Commissioner of Fisheries of the State of Maine, for 1870." Augusta, 1870.

"First Annual Report of the Geological Survey of Indiana, made during 1869." By E. T. Cox, State Geologist. Indianopolis, 1869.

"The Water-power of Maine." By Walter Wells, Superintendent Hydrographic Survey of Maine. Augusta: Sprague, Owen, & Nash.

"Monthly Reports of the Department of Agriculture for 1870." Edited by J. R. Dodge. Washington, 1871.

"Report of the Commissioner of Agriculture for 1869." Washington, 1870.

"To-Day:" a Paper printed during the Fair of the Essex Institute and Oratorio Society, at Salem, Mass. 1870.

"Report of an Inquiry in regard to the Prevalence and Ravages of the Colorado Potato-Beetle (*Doryphora 10-lineata*) in the Western Portion of Ontario." By Wm. Saunders and E. B. Reed. Toronto: Hunter, Rose, & Co.

COMMUNICATIONS RECEIVED.—G. S. W.—R. H. W.—R. B.—M. A. D.—J. R. S. C.—G. W.—H. T.—J. D.—E. F. B.—J. E. V.—J. S.—H. E. W.—J. C.—R. P.—A. J. J.—T.—N. B.—C. L. J.—W. H. W.—F. R. M. (No.)—W. R. T.—A. H. A.—M. D.—W. N.—E. F. E.—H. H.—F. V. P.—J. A.—E. M. P.—J. B.—J. C. H.—R. McK.—R. B. S.—B. T. G.—E. C. J.—W. A. C.—J. B.—J. H.—C. J. W. R.—R. P.—E. D. B—H. C. R.—E. G. H.—T. R.—R. S.—S. P.—J. M.—W. H. B.—C. F. W.—J. B.—G. H. H.—J. S. R.—H. M., Jun.—W. F.—D. D.—T. W.—D. J.—E. F. P.—J. S. W.—E. B. F.—J. C. H.—T. J.—I. W.—E. W. H.—J. B. B.—M. A. J.—G. B. E.—T. C. O.—S. S.—H. I.—A. P.—A. C. H.—W. M. H.—J. C. H.—C. L.—F. D. W.—W. M.—F. P.—C. B.—C. F.—J. F.—F. A. W.—J. G. R. P.—D. M.—S. S.

WHAT THE PIECE OF PURBECK MARBLE HAD TO SAY.

By J. E. TAYLOR, F.G.S., Etc.



HERE are few of my intelligent hearers who are not acquainted with the peculiarities of my appearance. In this civilized country, where old churches abound, I may have formed a portion of the fonts in which they were christened, or the pillars of the Early English doorway by which they will be carried to receive the last sacerdotal rites. As a slab near the altar, some of them may have stood on me whilst they took upon themselves the solemn duties of matrimony, little dreaming of the long lines of generation the obscure stone at their feet could tell them.

I belong to the upper part of that geological formation termed the "Oolitic," from the peculiar "roe-like" appearance often presented by some of its limestones. This general name is another of those instances of the early nomenclature of geology which are obliged to be retained now from their extended use, although they are found to be no longer specially applicable. Of course I cannot be expected to remember exactly what took place before I was born; all I can do is to tell you what I have heard, handed down by oral tradition through the long line of my ancestors. I am the last of the family, and left no descendants. After me came that series of deposits included under the general term "Cretaceous," or Chalk. But, as my hearers would expect, there are palæontological reasons for myself and brethren being grouped together. These are chiefly the family likeness of our included fossils, marine, freshwater, and terrestrial. I heard what my cousin the Piece of Jet had to say, and may here remark that it is a pity his formation is not considered as one of us, and not treated as if he were simply a distant connection. Many of his fossils are so much like those of our family that, even if they are specifically distinct, a good relationship to us may be made out of them.

The lowest beds of the great geological system to which I belong go by the modern name of the "Inferior Oolite." But though these follow in direct order, there was a great interval of time between the succession. This is plainly shown by the fact that out of the hundreds of species of fossil shells peculiar to the upper parts of the Lias, not quite forty species lived long enough to become fossilized in the lower beds of the Oolite; many of the rest became extinct, whilst others perhaps migrated to areas where the physical conditions better suited them. There was a greater longevity in certain creatures then, just as there is now; for we find several species of bivalves and ammonites existing during the long period of time which elapsed whilst the entire series of beds composing the Oolitic formation were being slowly deposited.

I will just give you the list of the principal of this series, mentioning them first in the order of their antiquity or seniority—a practice no doubt in vogue among yourselves. After the Inferior Oolite comes the Great, or Bath Oolite, and Stonesfield Slate. The Cornbrash and Forest Marbles complete what is termed the "Lower Oolite." Then come the Oxford Clay and Kelloway Rock, both perhaps contemporaneous—the Coral Rag completing the "Middle Oolite." The Kimmeridge Clay, Portland Stone, and Purbeck series form the "Upper Oolite," and bring the entire formation to a conclusion. These deposits stretch across England, in a belt of about thirty miles in width, from Yorkshire to Dorsetshire. They follow each other in tolerably regular order, and as they are relatively composed of shales, sandstones, and hard limestones, and as the entire series has been much exposed to atmospherical and marine wear and tear since they were solidified and

upheaved, it follows that this denudation has been so operative as to wear away the softer beds and to leave the harder standing. Hence the physical geography of the whole formation differs according to the underlying geology. Deep valleys or extensive plains lie where the clayey or argillaceous strata crop out; and broken hills, frequently with more or less steep westerly escarpments, indicate the areas occupied by the limestones and harder sandstones.

As might be expected, when it is remembered that this series of deposits was formed chiefly along the old sea-bottoms, there must have been an extensive and long-continued list of geographical changes rung whilst it went on. The bed of the ocean was alternately the receptacle for the fine muds brought down by rivers, along whose deltas grew the rich vegetation locked up in the coal-seams and shales of the Lower Oolite near Scarborough. Then we have evidence of a depression of the area, which removed the sphere of deposition of the mud, and brought clear water over the site. Here the physical conditions allowed mollusca, corals, &c., to swarm in abundance, and their accumulated remains thus formed the limestones. Calcareous sandstones were formed out of the comminuted coral reefs, shells, &c. Occasionally, influxes of mud killed off large numbers of encrinites, as at Bradford, near Bath, and buried them beneath its *débâcle*, clear water returning shortly afterwards, as the parasitic zoophytes, &c., which attached themselves to the broken joints of the encrinites, plainly indicate. At length the deposits more or less filled up the shallower parts of the sea, and upheaval converted a portion of it into dry land. The hollows of this land became freshwater lakes, in which swarms of *Planorbis*, *Paludina*, and other well-known freshwater snails lived. The water was clear, and there was no great amount of muddy materials carried into these lakes. Time only was required for the shells to accumulate along their floors to such an extent, that, in their solidified condition, they form the bulk of that well-known "Purbeck Marble" of which I am a humble and minute portion. Occasionally the sea-waters backed up the fresh, and encroached on some portion of the lakes, holding the place sufficiently long for brackish-water shells to live and multiply there, and to leave their remains behind them in token of what I have said. Even the pure sea-water once or twice gained ground, as the beds of fossil oysters, &c. intercalated in the Purbeck beds reasonably show us. In these different beds you find evidences of nearly all kinds of deposition, from the tolerably deep water in which the "Coral Rag" was formed, chiefly as a coral reef, to the ripple-marked flagstones of the "Great Oolite," in which also you get tracks of worms, crustaceans, &c. The total thickness of the entire series is about [two thousand four hundred feet, which alone will give you some idea of the enormous period of time represented by them.

There are few geological formations so rich in fossils as the Oolite. Not only in individuals, but also in species, the rocks are one vast museum, illustrating a particular stage in the world's past history. You may catch glimpses of life in every form of its enjoyment—in the mighty Saurians which frequented the open seas; in the busy coral reefs secreting lime; in the bony-plated fishes, whose glistening enamelled scales glanced through the waters. You see the low tide fringed by a vegetation, partly growing on the mud-banks as a swamp, and you distinguish forms now regarded as sub-tropical to Britain. The sea-bed is literally alive with cidaris, bivalves, univalves, sea-lilies, and lamp-shells. Overhead, over land and water, the flying lizards (*Pterodactyles*) whirl and swoop. The tiny kangaroo rats and opossums are busy in the forests, some lying in wait for their numerous insect prey, and others, more bloody-minded, are cannibally inclined! The great freshwater lakes, along whose floors I was formed by the simple accumulation of ordinary freshwater shells, were set in a dense and beautiful framework of pine-trees, of cycads, zamias, and tree-ferns. But, vast as the period of time is since this, the last of the oolitic series, was formed, numbering, as it undoubtedly does, *millions* of years, it has all elapsed within the lifetime of existing genera of shells! The *Paludina*, which principally make up my bulk, can hardly be told, even by experienced conchologists, from the ordinary freshwater snails which still inhabit English rivers! In structure of limb, tooth, and general adaptation, the highest orders of animals then existing were wonderfully like their Australian and North-American brethren.

In the swampier places, at the beginning of the oolitic period, where the vegetation grew thick and rank, beds of peat were formed and covered up by mud. This peat subsequently became coal. The iron diffused through the muddy mass was influenced by chemical action, so as to reunite and segregate, as an argillaceous carbonate, into layers and nodules of iron-stone. In this respect, the physical conditions greatly resembled those which existed during the Carboniferous epoch, and therefore the results are very similar. All you have to do is to transpose the animals and plants of the two eras, the difference in each of which represents the amount of time which had elapsed between them, and in which the vital modifications had taken place. In the Stonesfield slate—a calcareous shale, and a capital burial-ground of extinct animals—there were entombed the remains of at least four species of mammalia. As I before remarked, however, all the warm-blooded animals which lived during the Oolitic period belonged to the lowest order of their kind—the marsupials, or pouched animals,

notorious for bringing forth their young in a half-gestated condition. When you ascend higher in the Oolitic series, through the more purely marine deposits, where, of course, you would not expect to find the land creatures well represented, and come to the Purbeck beds, then you will be astonished at the large number of species of marsupials, and the great modification and adaptation in their habits which had taken place. The streams entering the lakes where the Purbeck marble was formed were much more likely to carry the carcasses of these dead marsupials there, and therefore the bottom of that lake was more likely to be a richer cemetery of their remains.

Some of the oolitic strata are much more favourable to the preservation of organic remains than others, and these invariably give us a glimpse of animal and vegetable life which, although of a much lower organization on the whole than the present, was yet admirably adjusted each to the other. Thus, the fourteen species of marsupials above mentioned were all obtained from a thin seam, three or four inches thick, in the Purbeck series, and from an excavated area of about five hundred square yards! Of all these rich fossiliferous deposits, however, perhaps the most interesting is at Solenhofen, where there occurs the stone of that name, much in use now, I am told, for lithographic purposes. The sediment of which it is composed is very fine, so that the quality which gives it its economical value to man is exactly that which has rendered it such a splendid sarcophagus for the fossils of the oolite. Forty years ago there had been obtained from this one deposit no fewer than between two and three hundred species of fossils, of which seven species were those of flying lizards, or *Pterodactyles;* six species were those of huge saurians; three were tortoises; sixty species were fish, forty-six were crustaceans; and twenty-six were insects, which had probably been blown from the land by the breezes, and eventually found a watery grave and an immortality they never dreamt of.

I have already spoken a little of the peculiar vegetation of this period—of the Cycads and Zamias and Tree Ferns, which had taken the place of the Calamites, Sigillaria, and Lepidodendra of the Carboniferous epoch. Besides these, there flourished other plants, now regarded as characteristically Australian, of which the Araucarian pines are examples; several species are found in the Inferior Oolite, whose cones showed that they lived and flourished not far distant. Then, again, in the so-called "dirt-beds" of the Portland stone, and also of the Purbeck beds, you have evidences not only of old land surfaces, but also of the dense vegetation which covered them. These "dirt-beds" plainly indicate the extended period during which these old cycadian and pine forests grew. Their remains are now found silicified, their trunks and stems lying recumbent amid the "dirt," whose fresh-water shells tell you how it had been the shallow bottom of a lake before it was a forest-bed, and that it was there its rich black soil accumulated! The Cycads are flattened somewhat by the pressure of the overlying beds, so that their bracts or scales give them a peculiar appearance, which, I am told, has earned for them among the quarrymen the name of "Birds' Nests."

As you are perhaps aware, the sea was still the home of the great fish-lizards, *Ichthyosaurus*, *Plesiosaurus*, &c. On the dry land the reptile family was represented by an abundant group, which goes under the general name of *Dinosauria*, or "terrible reptiles." Judging by the size of some of them, this name was not badly earned. But by far the most characteristic feature about these huge land reptiles was their near anatomical relationship to the *birds!* You hear a good deal of foolish talk now about "missing links," and those who make use of it little know that all the fossils are, more or less, of this nature, and fill up gaps in the natural history classification. Some of the reptiles of which I am speaking walked on two legs, like great Cochin China fowl, and with their hind quarters much more strongly developed than their fore limbs. In this respect they resembled, amongst the reptilia, the position of the kangaroo, which, as everybody knows, generally uses only his huge hind legs, his fore limbs being much smaller and weaker. One of these land reptiles, named *Compsognathus*, whose remains have been found in the Stonesfield slate, and which was only about two or three feet in length, is the nearest approach, in its general structure, to birds of any yet made known. As you are aware, all reptiles are egg-bearing in their habits, and the fossil eggs of the oolitic reptiles have been met with, showing that, so long ago as the Oolitic age, this class had the same habits as their diminutive representatives of the present day. But what is very remarkable is, that whilst the reptiles of this period had *bird-like* characters, some of the birds had *reptilian* peculiarities! No doubt you are aware that these two great groups of animals, birds and reptiles, follow each other in ordinary classification. They do so in order of time, the reptiles first, in their lowest grade as Amphibia (*Labyrinthodonts*), which gradually rise to a higher standard, until they assume features which, as I above remarked, now belong wholly to birds. Singularly enough, the true birds follow soon after, and the first specimen you meet with shows, in the structure of its tail-bones, &c., that it had borrowed some of the anatomical peculiarities of the reptiles! This strange bird is now known as the *Archæopteryx*, and its bones, and even *feathers*, have been found beautifully preserved in the Solenhofen stone. Here you have, at any rate, a meeting-ground on which two of the great divisions of the animal kingdom exhibit their mutual descent. It is a suggestive

fact for those of my hearers who are sceptical about "missing links!"

The ages which have passed away since these things occurred are bewildering to those who are anxious to know, in so many years, how old the world is, as if that fact would add anything material to their real knowledge. At the time of which I am speaking the area occupied by the Himalaya mountains was a deep sea-bottom: that great mass has been slowly elevated to its present great height since the era of my birth. The Jura Alps were in the same condition, and have undergone similar elevation. One generation of animals and plants after another has passed away from the earth, having been slowly pushed out of existence by newly-introduced species, better fitted to the alterations effected through the changes in physical geography. The whole of the oolitic strata of soft sands, oozy lime, and dark mud, as well as the beds of loose fresh-water shells, have undergone chemical action and change, and been transformed into sandstones, limestones, shales, and Purbeck marbles. Our family has been in past times, and is now, a favourite with man in his endeavour to express his religious convictions and æsthetical feelings. We form the stonework of his grand churches and cathedrals, and I myself had the honoured position of forming part of his altar, his christening-font, or his grave-slab! The tread of many generations of men has not effaced my lacustrine origin. Dynasties and religions have passed away, and been replaced by others breathing a more Christian and liberal spirit, just as the oolitic animals were replaced by those of a higher organization; but I still form part of these grand structures, silently testifying to the endurability of nature over art, and yet myself a testimony that Nature herself is full of changes, and restlessly advances to a more perfect condition!

A SPRING MORNING AT THE SEASIDE.

WE have chosen a quiet little spot on the south-east coast of England as the place where we intend to pass a morning at the shore; it is situated on the summit of a hill, from which a lane leads to the sea.

We are up betimes the morning following our arrival, and as we enter the street, a most fragrant air greets us. It is indeed a lovely morning; the sky is remarkably clear, and the sun very dazzling. The villagers are astir, and from the various shops and houses come the sounds of toil. Let us take the road to the sea.

The view is very beautiful. To our right is Beachy Head in the distance, with the white chalk near its point very plainly visible, as is also every roadway upon it. Eastbourne, a distance of some twelve miles, is also distinctly seen, and Pevensey Bay appears as a strip of sea of a sky-blue colour running inland; we are able to trace the bend of the bay, as also to count every martello tower on the coast as far as Eastbourne. The undulations and hollows in the headland are very noticeable (from the shadows), and a few light straw-coloured cirrhus clouds are hanging over it.

We now come to the view more immediately in front of us; a little to our right and on the coast is the Coastguard Station, with its little white houses and flagstaff glittering in the sun. We pass over the bridge of the London, Brighton, and South-Coast Railway; a few yellowish-coloured lichens line the red bricks of which it is built, and, darting about, are numerous tiger spiders (*Salticus scenicus*), evidently enjoying the sun's rays.

Immediately in front of us the lane winds down to the sea, which is stretched out before us, of a light greenish-blue colour, and streaked with long stripes of greyish blue. At the bend of the lane and at the side is a fisherman's black hut, standing out in bold relief against the sea. A fisherman passes, and gives us an *Echinus*, which he says he has had in his hat for two hours; consequently we have not much faith in its being alive. A little further on, we hear a curious rustling in the bank of the road, composed of ivy, brambles, dried leaves, twigs, and grass. We stop to listen; after a moment or two it is repeated, and stooping gently, and looking in the direction whence the noise proceeded, we discover that it is caused by little land-lizards (*Zootoca vivipara*), which are darting about jerkily amongst the sticks and dried leaves; we try to catch them, but they disappear in an instant. Here, on the bank, grows the sweet violet (*Viola odorata*), on the leaves of which some large beetles (*Meloe proscarabæus*) are feeding greedily, each downward movement of their heads or jaws making the semi-circular gap, already large, greater in the leaf.

Still following the bend of the road, we pass the black cottage, with its old-fashioned lattiecd windows and red-tiled roof; another turn takes us in sight of a raised beach, which now hides the sea from us, and we hear its dull plashing. We mount this beach rapidly, in excited anticipation of the first view of the rocks. We gain the top, where one or two boats are lying, and are now (for it is low water) in sight of the rocks, from which a delicious odour of seaweed is wafted to us; we take in a full breath, for we are loth to lose such pure air, and stand surveying the scene.

To our left lies a long strip of blackish-looking rocks, raised several feet above the sand, which extends beyond them to the left, and stretching out to the sea like a headland. Let us walk upon these rocks and explore them.

The first rocks which we step upon are much hollowed and fretted away, and their surface in some places resembles iron slag. They are scantily covered with balani (*Balanoides*), with very sparse

and small tufts of Enteromorpha (*E. compressa*), and thick viscous tufts of an olive-brown colour, looking like confervoid algæ, but which we find, on examination with a low magnifying power, to be diatoms (*Schizonema*) growing in a gelatinous envelope. Let us walk on; the Enteromorpha becomes thicker, and covers the mounds of the rocks in long vivid light-green fringes.

We will now examine our first rock-pool; it is about six yards distant from the beach, is very shallow, and hardly three inches at its greatest depth; the water in it is clear as crystal, and the surface is just disturbed by the faintest ripple. The Ulva and Enteromorpha grow from every part of the bed of the rock-pool, except in the hollows, where there is none. Growing between these seaweeds, and covering the bed of the pool, is a short muddy-coloured filamentous-looking substance. On magnifying some of this, it turns out to be diatoms growing in long chains (*Grammatophora marina*). The margin of the pool, which is very rugged in outline, is partly fringed with Ulva (*U. latissima*), whilst on the highest and most exposed portion grows the Fucus (*F. vesiculosus*), the fronds of which hang partly in the water, and are partly left dry; it is of a dark olive-colour, except at the tips, or rather receptacles, which are much lighter in tint.

The sides of the pool which are left dry are composed of the substance resembling iron slag in some parts; in others they are composed of tiny rounded and smooth mounds, close together, having the appearance of iron. They are covered with balani (*Balanoides*) to the number of thousands. Here we have an immense army; but each individual cirrhiped has to receive its daily supply of food from the returning sea.

On the Ulva in the pool a periwinkle (*Littorina littoralis*) is lazily crawling. The animal life therein seems (with the exception of the balani) but scanty, and we only catch sight of a single sandhopper (*Talitrus*); but, on stooping, and examining the pool intently, discover one of the minute Entomostraca proceeding through the water, and, skipping about on the surface, a white and small podura.

The rocks in the vicinity are composed of a greyish and gravel-coloured sand. They are very friable, and are arranged in mounds.

Let us walk on. We leave the mounds of sandy rock to our left, their summits covered with the long tufts of the Enteromorpha, looking lovely in the sun's light; and, as we proceed, notice that the Fucus gets much thicker, and nearly covers every prominence. In some places the fronds are much broader. Here and there in pools are mussels, studded with young balani, which are hardly the 1-32nd of an inch in diameter. We take up one of these mussels and examine it. It is covered with young balani on the upper surface of the shell exposed to the light, whilst on the under half, or that portion upon which the mussel is lying, there are none.

Let us walk forward (we have taken but eight strides from our first rock-pool). The *Fucus (vesiculosus)*, which at our first pool was about three to four inches long, is now in some places fully sixteen inches in length. This Fucus grows in a straight and narrow stem (of the length of six inches) from the rock. It then divides into three bunches of fronds, each composed of two flat branches, which again are bifurcate, and terminate in the receptacles.

The *Ulva latissima* is now growing together with the Fucus, on which a good many periwinkles are crawling. At twenty-four yards from the beach we find our first tuft of the seaweed *Polysiphonia*, of a lovely purple hue, growing in a shallow pool of three inches in depth, and in a position facing the east. Some Ulva is growing from the Polysiphonia, the tuft of which is nearly dry at the place of its attachment to the rock, whilst the ends thereof hang freely in the water. Sprawling over the branches of the Polysiphonia in a very slow and listless manner, are several of those queer-looking objects, the Pycnogons (*Nymphon gracile*). We move the tuft very gently. As we do so, numerous sandhoppers and small crustacea start from it, and immediately underneath it is revealed to us a mussel (*Mytilus edulis*), his beautiful gills stretched to their fullest extent, and we may presume he is now actively engaged in taking in his morning meal. Immediately under the mussel, and partially imbedded in the deposit, is a small oyster-shell, of which we get a lateral view. On its upper edge is an anemone (*Actinia chiococca*), whilst on its under surface, and seen in profile, are full-grown balani (*Balanoides*), whose cirrhi, we can see, are working rapidly.

At forty yards from the shore we find some very fine purple tufts of Polysiphonia, growing on both the east and west side of the pool. Resting on its branches, and motionless, is the crustacean *Idotea tricuspidata*. We have here also a very thick and bushy mass of olive-coloured alga, having the character of conferva, which looks, at first sight, very much like *Schizonema*. It is growing from the flat frond of a piece of fucus in the water. We place a small tuft of the Polysiphonia in our zoophyte-trough, and magnify it with our half-inch objective. Its branches are crowded with diatoms, and some large orange-coloured rotifers are gliding about. To the naked eye they appear about the 1-24th of an inch in length.

At an estimated distance of one hundred yards from the shore we find rock limpits (*Patella vulgata*) and the zoophyte *Sertularia geniculata* growing from a frond of fucus. The mussels are now very numerous, and close together in the gulleys between the rocks, and are affixed by their byssus to the

sand and mud which has washed in by the tide. By detaching some of these mussels and examining their muddy bed, we find numerous specimens of the graceful little starfish *Ophiura*. The rocks here are still composed of a sandy substance, and on which (rocks left dry by the tide) we find a bunch of fucus, which is nearly entirely covered with the cells of that large and handsome member of the marine polyzoa, *Halodactylus;* and we think what a grand sight it would be if we could see all the polypes expanded with the *binocular* microscope, and with a *dark ground illumination*. We notice here also, in a shallow pool, the arborescent structure crowning the tube of the marine annelid *Terebella*, just protruding from the sand, and, crawling on the adjacent fucus, the little orange-coloured winkle (*Littorina littorea*). On the side of a rock-pool not far removed, and growing in an eastern aspect, we find very young tufts of the delicate feather-like seaweed *Bryopsis plumosa*, and on the same side there is a perfect miniature forest of the zoophyte *Campanularia geniculata*.

We introduce a small fragment of rock covered with Campanularia into our zoophyte-trough. These zoophytes really look lovely. Imagine a tree-like structure, of crystalline transparency. At the summit of each branchlet is a sort of cup, exquisitely hyaline. This cup contains the body and mouth of the polype, the latter situate in the centre, and surrounded with numerous diverging tentacula, of equal length and at equal distances from each other, falling in graceful curves over this cup. The mouth and tentacula can be both protruded and retracted at the will of the polype. The latter are highly sensitive, for we notice, whilst observing them in the trough, that a small grain of sand falls upon one of them. It immediately bends upwards, as if to clutch the same. The mouths of most of the polypes are inflated, and protrude from the cups.

The life of the polype is seen to extend through all the branches. The polypes themselves are equal in beauty to the most exquisite flowers.

Not far from the pool containing the zoophytes, and in another of three feet in depth, we find the long fronds of the seaweed *Laminaria saccharina*.

We now (at 150 to 200 yards in a direct line from the shore) arrive at some rocks which have a different aspect. They are *completely covered* with balani (*Balanoides*), in all stages of growth, from the tiny young balanus of hardly the 1-32nd of an inch in diameter, to the full-grown individual. Not a fragment of fucus grows upon these rocks. To reach them we have to cross a wide gully, in which the mussels are lying so closely together that we cannot introduce the chisel to separate them. In this gully we find three huge specimens of the common starfish (*Uraster rubens*),—one of a dull vermilion, inclining to orange; the next of a straw-colour, and the last a variety (*violacea*) which measures at least eight inches from tip of one ray to that of the opposite one. Its colour is a splendid reddish violet.

As we walk on to these rocks our footsteps cause a loud hissing sound, which is continued into the distance: it is caused by the crowds of balani, which are shutting up closely, probably disturbed by the vibrations given to the rocks by our approach. Lots of white and yellow purpuræ (*Purpura lapillus*) are crawling about here, and their eggs are rather plentifully distributed. We detach a group of the latter; the majority are of a very pale yellow colour, but one or two (probably those which are most developed) are purple. Here we have also the white sea-slug (*Doris tuberculata*); of zoophytes, the large *Tealia crassicornis*, strawberry anemones (*Mesembryanthemum*), *Coryne pusilla*, *Sertularia geniculata*, growing from the rock; of polyzoa, the yellowish spiral masses of the birdshead polype (*Bugula avicularia*) and *Bowerbankia imbricata;* of seaweeds we have small tufts of *Bryopsis plumosa*. In one pool there is quite a collection of various moving shells; they are tenanted by hermit crabs (*Pagurus Bernhardus*). By turning over some large flat stones, we find the handsome little crab *Porcellana platycheles*.

These rocks are raised above the sand (which lies on the left) to the height of four feet; there are numerous little pools in them like craterlets. It is very convenient, whilst standing in a gully, to bend over and peep into these. One of them, of a foot in diameter, is covered with the zoophyte *Campanularia geniculata:* even the shells of some limpets which are crawling therein are covered.

We are closely scrutinizing one of these little pools when we hear, to our regret, the plash of the returning sea. We therefore leap hastily from these rocks to the sand, and retrace our steps, determined, however, on the way back to examine some of the overhanging ledges of rock which we pass. After getting our bodies into the most awkward positions, and our heads into those promoting considerable congestion, our search is at length rewarded by finding the fleshy-looking masses of the splendid zoophytes *Tubularia indivisa*, from the heads of which there is a constant trickling of sea-water, as it percolates through the ledge under which they are situate. Side by side are the mud-coloured bunches of the polyzoa *Anguinella palmata*. Situate between some of these bunches, and projecting, are the tubes of the annelids *Sabellæ*, from which the closed plumes of the worms (of a reddish colour) just protrude. A little nearer to the shore, and just peeping out of his short symmetrical tube (composed of tiny grains of sand cemented together), which is half buried in the sand, we find the annelid *Pectenaria*, the comb-like appendages to his head shining like gold; we drop him into our vasculum and walk on. Near to the

shore, the rock to our left is covered with long fronds of ulva, which looks very fresh as it hangs down, and the seawater trickles from it and drops on the sand beneath.

We soon reach the beach again, and toil our way back; for we are a little fatigued, from stooping and kneeling over rock-pools. We think of our vasculum, however, which is full of marine treasures, and are content. We also look forward to the pleasure of sorting them and examining them with the microscope, and of transferring them to our marine aquarium in town, where, if we have not the glittering, cheerful view and bright atmosphere which we have just left, we have, at least, the consolation of being able to study some of our pets, and the chance of keeping some of them in health.

The morning is now somewhat far advanced, and the sun begins to have great power. On the cliff at the entrance of the lane are numerous Tiger beetles (*Cicindela campestris*); they are very shy, and the moment our shadows cross them, fly away. They have a peculiar manner of running a short distance, and then stopping suddenly, with head erect, as if listening. They are also rather quarrelsome; for we saw one alight near its fellow and chase it away, much in the same manner as sparrows when they have secured some morsel of food which they wish to keep to themselves. The jaws of these beetles are certainly most formidable.

We walk back to the village, our minds yet filled with beautiful visions of rock-pools smiling in the sun's light. Perhaps these may be redeveloped in us, when in the gloomy winter of the metropolis, with great force, and then we may hear again the plash of the sea, and enjoy in imagination the beautiful calm of a spring morning at the seaside.

O. M.

A STREET DOG.

THERE is a narrow Westminster street, with little shops and lodging-houses on either side of it. It is a dirty, noisy little street, and gives access to a broader, quieter one, with better houses, whose faces look out into the Park and its green elm-trees. Troops of children from the little street play and shout in and ring the door-bells of the great one. From the windows of one of those houses I have watched the games of the children, and observed them to be generally shared by an ugly, smooth white dog, with a sharp nose and a few black spots. When an organ-man came to play, the children danced with the dog, holding his unresisting forepaws. If a woman from the little street came through with her basket on her way to market, off started the dog with barks and leaps of joy, to accompany her as her guard and companion, and returned with her when business was over. We never could make out whom the dog belonged to. We met him sometimes with one person, sometimes with another. All the children loved him, and the grown people seemed to have a friend and possession in him. His name we found to be "Spot;" and one day we found out poor Spot's private history. In the little street was a very small sweet-shop, much favoured by the children of our family, amongst whom it went by the name of "The Little Woman's." The little woman sold haberdashery and illustrated papers, besides her sweets, and during his leisure hours Spot was often to be found sitting bolt upright on her door-step. We used to stroke his head as we passed him, but he would scarcely care to recognize us. His mind was fully occupied with his own friends, and kind friends they seem to have been. First of all, however, came a tragedy. Some cruel person half hung the poor dog, and cut his throat. A kind woman and her daughter, living in the street, took the dog in, sewed up his throat, nursed him carefully, and restored him to health. This seems to have been the commencement of his career as the street dog; but, instead of his being homeless, the street itself owned him and became his home. He slept at the little sweet-shop woman's, and every day she bought a piece of meat of the cat's-meat man, so that Spot was sure of one meal. I have offered him a bit of biscuit sometimes when I met him, but he did not seem to care about eating it; so I think he was well fed. The two streets harboured no other dogs, for Spot would come tearing down the whole length of them, and clear out any strange dog who ventured to loiter there. For years he has been a loved and valued street dog. Every one seemed to speak kindly to him; and I have met him long distances from home, following various masters and mistresses. He always looked business-like and decided. At length came the new rule about the dog-licenses. Of course, no one had ever paid a tax for Spot—no one need claim to be his real master; but the "little woman" thought differently about the license. As a street dog—an ordinary, vulgar street dog—poor Spot might have become the prey of the police; so this good woman went the round of the other little houses and shops, and collected a little every here and there from Spot's kind friends, until she had enough to pay the license. So the street keeps its own dog with its own license. I have left the neighbourhood now; but whenever I have lately chanced to pass the little street, I have seen the familiar ugly form of Spot sitting serenely amid a group of children.

Y. S. W.

RICH MEN.—He is the richest man who knows how to draw a benefit from the labours of the greatest number of men.—*Emerson.*

THE Y-SHAPED ORGAN OF PAPILIO LARVÆ.

MR. CLIFFORD, in his interesting notes on Horned Caterpillars (p. 193), cites the statement of Bonnet, "that a caterpillar of *Machaon*, which he touched, directed the horn towards the fingers, as if to strike." He adds, "Other observers have not as yet confirmed this." Permit me to confirm it by a collateral observation.

From an Entomological journal which I kept in Newfoundland, in the year 1835, I extract the following notes on the larva of *Papilio Asterius*, a species closely allied to our *Machaon*. "From the very first ring of the body, just at the back of the head, there proceeds a soft, flexible, forked organ, of an orange colour. I have seen it protruded to the length of three-quarters of an inch. At about one-eighth of an inch from the base it divides into two branches, each curving outwards, and tapering to a blunt point. This organ is usually drawn in, and quite concealed within the neck; and the caterpillar protrudes *one* branch or *both*, at pleasure. I have watched the parts at such times, and have observed that two transverse lips appear to open in the neck, and the fork is thrust out, *not the points first*, but *the base*; the whole structure being *turned inside-out*. I am convinced that its use, or at least one of its uses, is as an instrument of defence; for, on my touching the side of the caterpillar—the left side, for instance—it would jerk round its head towards the place, and protrude the left division or branch of the Y; on my touching the right side, it would thrust out the right branch, keeping the other in. The operation was always accompanied by a strong fœtor, like the odour of parsnip—the plant on which the larva feeds; it left a slight wetness on any object touched. Often, when I suddenly opened the box in which I was rearing these caterpillars, they would thrust out both branches of their Y-organ, with a gush of the odour; and then, in a few seconds, gradually draw them back by involution."

The larva of *Papilio Turnus*, a companion species to the one I have just named, throughout the Atlantic regions of North America, from Newfoundland to Alabama, possesses an organ of exactly similar structure, and uses it in an exactly similar way. So does that of *P. Philenor*, a beautiful species, of the Southern States. Of all these I speak from personal observation; but I have little doubt that the organ is common to the entire genus of Papilio as restricted.

Doubleday, in his beautiful work, "The Genera of Diurnal Lepidoptera," limits his notice of the organ to the technical diagnosis of the family *Papilionidæ*, and those of the two genera, *Ornithoptera* and *Papilio*. In the former he says, "The larvæ are furnished with two retractile tentacula on the prothoracic segment, which are extended when the animal is irritated, and then exhale an aromatic, but mostly disagreeable, odour." In the diagnosis of *Papilio* he merely defines the *tentacula* as "without any external sheath," thus distinguishing the genus from *Ornithoptera*. Taking no notice of the familiar European and North American species, he singles out the rare *P. Hippason* of Guiana, of which he says, "If we can trust to Stoll's figure, the prothoracic tentacula or *osmateria* are largely developed."

I am not without hope, therefore, that these little notes of mine, which have lain for six-and-thirty years within the leaves of my portfolio, may contain a contribution, even though trifling, to knowledge.

Torquay. P. H. GOSSE, F.R.S.

MONOTREMATA.

CERTAIN four-footed beasts which were at one time ranked among the Edentates, or toothless animals, are now—for good and sufficient reasons, founded on structural peculiarities—included in a separate order under the above name. Among them is the Australian Hedgehog (*Echidna*), which is furnished with a coat consisting entirely of stiff bristles. Its affinity with the European Hedgehog is of the most superficial kind. Without going into anatomical details, it may be mentioned, that whereas the Hedgehog is furnished with a mouthful of sharp teeth, *Echidna* can boast only of a few hard points in the back of the jaw as the sole representatives of those very useful appendages. The mouth itself is prolonged into a tubular beak, which is equally serviceable in its way; for within this beak lies concealed a long tongue, which can be protruded three or four inches beyond its sheath, and is provided with glands capable of secreting a thick viscid fluid. Termites, ants, and "such small deer" form the food of *Echidna:* these it hunts out with the aid of its long snout, which is constantly at work "rummaging" in the *débris* of the forest. Backwards and forwards, in and out, goes that pitiless tongue, each time clothed with a fresh supply of glutinous matter from the glands at its root, and each time drawing in a host of victims clinging helplessly to its sides and point. Of necessity, *Echidna* takes in with its food a large amount of dirt, stones, and fragments of wood; indeed sometimes the stomach is half filled with such matters. With all this, it possesses wonderful powers of abstinence. "One in the possession of Messrs. Quay and Gainard refused all sustenance for a month after its capture, without appearing to suffer in its general health, though it became thinner."—*P. H. Gosse, Intr. to Zool.*

The nearest relative of the *Echidna* is an animal very little like it in outward aspect, but even more remarkable in habit and appearance. This is the Water-mole of the colonists, and the Mallangong of the natives of Australia, but dubbed by Blumenbach with the lengthy title of *Ornithorhynchus paradoxus;* and a veritable paradox it is, with its webbed feet and duck's bill. It is a shy, harmless creature, living on the banks of ponds and rivers (in South-eastern Australia), in which it excavates long galleries ramifying widely. Its food consists mainly, though not exclusively, of aquatic insects, very small shellfish, &c. As in the case of *Echidna*, the contents of the stomach are always mingled with foreign matter, such as mud and gravel, "which latter may be required to aid digestion." (*Proc. of Zool. Soc.*, i. 229.) Like the ducks, whose beak they bear, the *Ornithorhynchi* obtain the greater part of their food by routing in the mud.

Itchen Abbas. W. W. Spicer.

THE GOAT-MOTH.

In the autumn of the year 1827 the larvæ of the Goat-moth abounded beyond any customary proportion, and we could commonly see the traces made by these creatures in the dust. They had apparently fed during the summer in the earth, and were now proceeding in search of a retreat during winter to some old hedgerow-tree, a part to repose, and those which approached maturity to abrade the softer wood, and form their cases preparatory to changing to a final perfect state in the spring. At times we observed them coursing along our paths with great strength and activity; and when not seen, that peculiar subtle smell which proceeds from them, and has been thought to resemble that of the Goat, was perceptible in all our walks. The object and seat of this odour seems not well understood. Some have conjectured it to proceed from a fluid evacuated from the mouth, and discharged to soften the wood in which they burrow. But it seems inconsistent with any probability that this creature, which is furnished with such very powerful mandibles, should be gifted with an auxiliary aid to accomplish its object, while of the many insects which perforate timber, most of them with inferior means, no other possesses an equivalent agent to facilitate its labours; for not one of them, so far as we know, is so supplied. Besides, if such were the purpose, the discharge would be made only when required, and thus this unpleasant odour would not be always perceptible. The strength of their jaws is so great that they will very soon destroy any common chip-box in which the animal may be placed, by abrading the edges to effect its escape. With us they chiefly inhabit the ash; and we very commonly see, at the roots of our aged trees, the fragments removed by them in forming their passages. In breaking up the decayed pollards, we not unusually find the grub in all the stages of its growth; but more generally observe them without inhabitants yet perforated with paths large enough to admit the finger. I suspect that these "auger worms" are the primary cause of the decay of the tree; having often observed their perforations, and found them both large and small in the solid spur or root of the tree, when the upper portion, having been bored and in a state of decline, is abandoned by them. Those that are full-fed appear to form their cases in that part which has lost coherency, while the younger and imperfect creatures mine their way and obtain nutriment in the solid timber; thus killing the tree by inches, when rain and moisture find lodgment and complete the dissolution. One year's preparation is the period usually assigned to the larvæ of most insects before they arrive at their perfect state; but by the Goat-moth three years are required before it attains its winged state from the egg. Consequently, for the larger portion of its life it is occupied in these destructive operations; and thus this creature becomes a very powerful agent in reducing these Titans of the vegetable world, crumbling them away to their original dust.

All the larvæ which I have observed in the colder portions of the year were hard, stiff, and torpid, but soon became relaxed and animated by the warmth of the hand. Thus they probably remain quiet during the winter months, but revive in spring, and recommence their ravages in the tree.

The caterpillar of this moth I believe to be the largest of any of the British Lepidoptera, and when full-fed exceeds in size that of the Death's-head Sphinx. To those who dislike the appearance of things of this nature it is particularly disgusting, not only from its magnitude and smell, but from its colour, which is a lurid red, so compounded with a dingy yellow as to give it a lividness of look, conveying the idea of something raw. Common as the grub is in some years, I have seldom been able to obtain the moth without the often tedious process of feeding the larvæ and waiting for its change.—*Journal of a Naturalist.*

NEW BOOKS.

Modern Scepticism.*—Scepticism is one of the decided tendencies of the age, not theological scepticism merely, for that is only one phase of the same spirit, but universal scepticism. It pervades all ranks of life, more or less; and the evidence is very strong that it is at work as much amongst theologians themselves as outside their circle.

* "Modern Scepticism: a Course of Lectures delivered at the request of the Christian Evidence Society." London: Hodder & Stoughton.

Theologians will not deny that there is a great deal of free thinking, and despising of authority, and other manifestations of scepticism, amongst all sections of the Church, from the Roman Catholic to the smallest section of Dissenters. With all this we have nothing to do. It has always been our aim not to meddle with things beyond our province, but the present volume is sent to us and we notice it, not to condemn its arguments, support its facts, or applaud its tendency. Our object is to protest against the assumption that it is amongst the students of science that scepticism is spreading, or that our leading men of science are high-priests of scepticism. This is evidently the feeling of many of the very excellent men who have been delivering these lectures, but it is a mistake. It may be true that the majority of scientific men pronounce their "shibboleth" in some other than the orthodox way, but they do not trouble themselves whether one or one thousand follow their example. They are not propagandists of faith, but exponents of fact, and it is a mistake to attribute to their influence the scepticism of the age, from which clergy are no more exempt than laity. We may add that we have perused the lectures with interest. Those who make use of scientific theories, without understanding them, as a cover and excuse for their own scepticism, will hardly take the trouble to read this volume. It would do them good. As for the rest ——Truth is great, and will ultimately prevail.

Woolhope Transactions.*—The annual volume of these excellent Transactions is even thicker than its three predecessors, and fully as interesting, as useful, and as creditable as the best. The photographs of remarkable trees are continued, as also are Dr. Bull's papers and portraits of edible fungi. We dare not attempt to enter upon any detailed account of the contents of the volume, since the bare enumeration would fill all the space at our disposal for this brief notice, but we cannot forbear the expression of our opinion as to the excellence of the work done by this club, as evidenced by these annual volumes. It is very rare that a local society confines itself to local matters, but this club proves that such a course may be pursued, with satisfaction to the members and advantage to science. These volumes should undoubtedly be found in every British naturalist's library.

Handbook of British Fungi.†—We cannot be expected to pronounce an opinion on this work, which has long been promised and is now completed and delivered to subscribers. All we desire to do is to intimate to those who are not yet fortunate enough to possess it, that it is a complete key to the mycological flora of Britain up to the time of going to press. Every genus has its description and its illustrative woodcut, giving the special distinctive features of the genus; most of these are microscopical. Each order has also an artificial key to the genera it contains. In hundreds of instances microscopical measurements of the spores are given, both in decimals of an inch and of a millimetre. A full and compendious index to genera, species, and synonyms is given at the close. An introduction is wanted detailing the structure and affinities of the different groups; but as this would have occupied at least another volume of equal bulk, it is postponed for the present.

Life beneath the Waves.*—This little volume is another about sea-anemones, star-fish, shrimps, crabs, molluses, and the many inhabitants of the sea, not only deep beneath the waves but also along shore. If we were challenged to say in what features this book is superior to its many predecessors, we confess that we should feel puzzled. Already we have a legion of books for the seashore, and yet another and another makes its appearance. After all,—well it may be prejudice—give us one of the many books written by that veteran Philip H. Gosse, rather than twenty such as we could name if we were compelled to do so, including the present. If the author has "yielded to the solicitations of friends," then the friends are to blame, unless they are shareholders in the Brighton aquarium, in which case, perhaps, such an advertisement may be presumed to pay.

* "Transactions of the Woolhope Naturalist Field Club for 1870." Hereford, 1871.

† "A Handbook of British Fungi, with descriptions of all the species, and illustrations of the genera." By M. C. Cooke, M.A. In 2 vols., crown 8vo. London: Macmillan & Co.

BEAKS OF INSECTIVOROUS BIRDS.

IT is impossible not to admire the wonderful variety of form exhibited in the beaks of birds whose mission it is to thin the overcrowded ranks of the insect world. They are, as may be supposed, much weaker than in those tribes which, like the Parrots, are destined to break strong nuts, or, as the Eagles and other birds of prey, have to tear tough flesh to pieces and to separate elastic cartilage. Still there are exceptions. The Woodpecker is one—that veritable carpenter of the forests, which

> "to the trunk
> Close clinging, with unwearied beak assails
> The hollow bark; through every cell the strokes
> Roll the dire echoes."

Its work is to pickaxe a gallery in tough wood: its beak, in consequence, has the form of a wedge, and is endowed with a strength and force which enables

* "Life beneath the Waves, and a description of the Brighton Aquarium." With numerous illustrations. London: Tinsley Brothers.

its possessor not merely to tear away the stringy, fibrous bark, but to penetrate deep fissures in the body of the tree, and to dig long galleries in the larger branches, in search of its insect prey.

Perhaps the most powerful of these workers in wood is the Ivory-bill (*Campephilus principalis*), so called from the colour and consistence of its

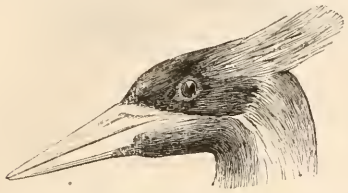


Fig. 124. Ivory Bill (*Campephilus principalis*).

polished beak (fig. 124). "Wherever (says Wilson, in his 'American Ornithology') he frequents, he leaves numerous monuments of his industry behind him. We there see enormous pine-trees with *cart-loads* of bark lying around their roots, and chips of the trunk itself in such quantities as to suggest the idea that half a dozen axemen had been at work there the whole morning. The body of the tree is also disfigured with so numerous and so large excavations that one can hardly conceive it possible for the whole to be the work of a woodpecker."

Another exception we find in the Oxpeckers (or Buphagids) of South Africa, whose strange destiny it is to relieve the buffaloes of the parasitic larvæ with which their hides are infested. The beaks of these birds are remarkably strong, and square in shape, well adapted to pierce the thick integument with which these animals are clothed, and to tear the disgusting grub from its place of concealment.

Where the aliment is of a mingled nature, partly of grain and partly of insects (which is, in fact,

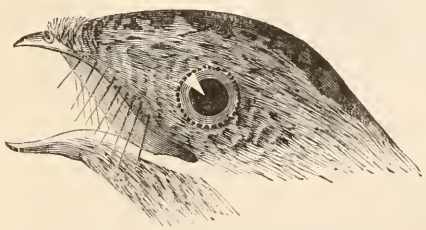


Fig. 125. Goatsucker (*Caprimulgus*).

usually the case), the beak is short and tolerably strong; where it is purely animal, it is weak in structure, though variable in shape. Thus, the birds whose lot it is to capture and devour their prey on the wing—the Swallows and Goatsuckers—are furnished with a flat, wide mouth, adapted to grasp, not to break up, floating bodies; an operation considerably aided by a number of stiff hairs which surround the base of the bill (fig. 125). On looking at the beak of the Humming-bird, we "find this organ to be greatly diversified in form, and that each of these variations appears to be specially adapted for some given purpose. Indeed I have never seen the law of adaptation more beautifully exemplified than in the multiplied forms exhibited in the bills of the members of the various genera of this family of birds. If we examine the extraordinarily lengthened bill of *Docimastes ensifer* and



Fig. 126. *Lesbia Gouldii*.

the short, feeble bill of *Lesbia Gouldii* (fig. 126), we see the extremes as regards the length of this organ, and we are not less astonished at the functions they are both intended to perform. The bill of the *D. ensifer*, which is more than five inches

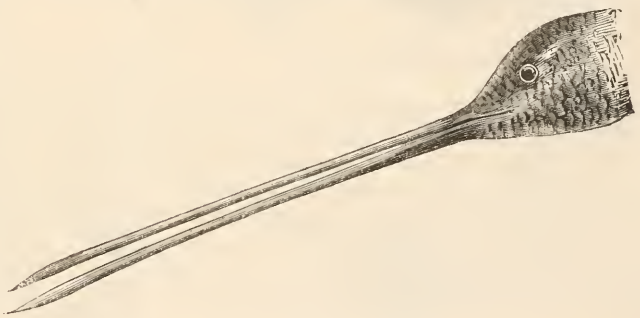


Fig. 127. *Docimastes ensifer*.

long (fig. 127) and which contains a tongue capable of being protruded nearly as far beyond its tip, is most admirably fitted for the exploration of the

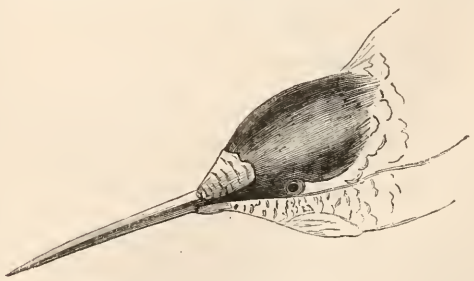


Fig. 128. *Helianthea eos*.

lengthened and pendent corollas of the Brugmansiæ, while the short-billed Lesbiæ cling to the upper por-

tion of these flowers, pierce their bases, and with the delicate feelers at the extremity of the tongue readily secure the insects which there abound. In no part of America are there so many tubular-flowered plants as among the Andes; and the greater number of the humming-birds found there have straight and lengthened bills, such as the members of the genera Helianthea (fig. 128), Bourcieria, Coligena, &c. The arched bill of the



Fig. 129. *Phæthornis anthophilus.*

Phæthornithes (fig. 129) is admirably adapted for securing the insects which resort to the leaves of trees, and upon which these birds are said to exist. But how much are we astonished when



Fig. 130. *Eutoxeres aquila.*

we examine the bill of Eutoxeres (fig. 130), and find this organ curved downwards beyond the extent of a semicircle,—a form beautifully adapted for exploring the scale-covered stems of the larger palms. Let us turn to another genus of the group, *Grypus;* here the bill is not only armed with a strong hook at the end of the mandibles, but with a row of numerous and thickly-set teeth.* The *G. nævius*



Fig. 131. *Heliothrix auriculata.*

is said to frequent the borders of the great forests, and to gain its food from among the interstices of the bark of the palm-trees. All the members of the genus Ramphomicron are said to feed on insects which inhabit the Alpine floræ; and their bill is well suited to the capture of the minute insects found in those elevated regions. In some instances the bill is perfectly wedgeshaped, as in Heliothrix (fig. 131); while in others it suddenly turns upwards,



Fig. 132. *Avocettula recurvirostris.*

as in Avocettula (fig. 132). Besides these, there are others whose bills approach somewhat to the form of the Flycatchers, as the Aithurus (fig. 133). This bird, we know, frequently seizes insects on the wing,



Fig. 133. *Aithurus polytmus.*

and so, doubtless, do many of the others. It will have been seen that all these forms of bill are well suited for the capture of insects, and, as might be supposed, insects constitute the principal food of the Humming-bird. (J. Gould, "Monograph of the Trochilidæ.") I have been tempted to give the above lengthy extract from Mr. Gould's great work on the Humming-bird tribe, partly from the admirable manner in which the author illustrates the subject before us, and partly from the fact that so large and expensive a work is probably in the hands of but few of the readers of SCIENCE-GOSSIP.



Fig. 134. Woodcock.

In certain cases the food is sought for, not in the air or on dry land, but in the water, or in mud an other soft earthy matter. Here the beak is again modified for the purpose in view, and it usually takes one of two typical forms. The Woodcock (fig. 134), Snipe, and other members of the family of Scolopacidæ, are furnished with a very long and pointed bill, which is further supplied with a remarkably

* This structure, according to Mr. Darwin ("Descent of Man," ii. 39), is confined to the male bird. He adds, "In the curious Neomorpha of New Zealand there is a still wider difference in the form of the beak, and Mr. Gould has been informed that the male, with his straight and stout beak, tears off the bark of trees, that the female may feed on the uncovered larvæ with her weaker and more curved beak."

sensitive tip (fig. 135), admirably adapted for searching far below the surface in boggy and marshy ground, and extracting therefrom larvæ and worms. At other times it is spread out, as it were, into a



Fig. 135. Bill of Snipe (Yarrell).

broad flat surface, the very antipodes of the one just mentioned (fig. 136), but equally well fitted to the wants of its possessor. The apex, too, is rounded, and without the sensitive integument which is so

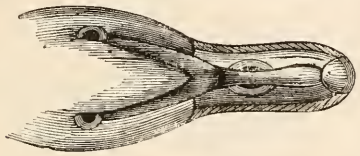


Fig. 136. Common Swan.

important an aid to the Snipe and the Woodcock in their researches. In lieu of this, the sides of the bill are bordered with a network of fringe, which allows of the expulsion of the mud through its



Fig. 137. Shoveller.

meshes, while it retains the fat grub or the juicy worm. It is with this form of bill that we see a group of ducks at the side of a village pond "discussing" the *débris* taken up, and rejecting what is not needed for their support (fig. 137).

Itchen Abbas. W. W. Spicer.

The Flea.—Mr. Furlonge having courteously forwarded me a copy of his interesting paper on the Anatomy of the Bed-flea, I am pleased to observe that his remarks on the subject of the "Triangular Plates" so far coincide with mine (p. 155), that he considers them as covers, though not particularly of the lancets. My views are, therefore, so far strengthened. This was the chief point of my paper. I will not enter upon others mooted by Mr. Furlonge, which will no doubt be well discussed at the Quekett Club. I will venture, however, to add that I still hold in the main by Professor R. Jones's explanation, as quoted by me: that the cutting instruments are two,—viz., the lancets; that the tongue is a suctorial organ, and nothing more; and that the tongue-case is not in any way a cutting instrument; though this is not in accordance with Mr. Gosse's views, nor those of the Micrographic Dictionary.—*S. S.*

INSECTS AT BATH.

A CORRESPONDENT inquires concerning the nature of the insects which fell lately at Bath. I beg to inclose a photograph of a drawing of them, made by a friend of mine in Bath, a gentleman well versed in natural history.



Fig. 138.



Fig. 139.



Fig. 140.

Copy from Photograph of insects that fell at Bath.

W. B. Gibbs.

CARRIER PIGEON AND PLOVER.

A FEW weeks ago I procured a young plover (*Vanellus cristatus*); it had been reared by a cottager in Hertford. At the time it came into my possession it was just commencing to feed itself; being tame, it readily fed from the hand, which made it quite a household favourite. Of course, such a pretty bird is an object of interest among my friends—his large, soft, inquiring eye, fine crest, and glossy green feathers, tipped with gold, are not

a little attractive. As soon as my pewet could do for himself, he was transferred to the aviary, a place he seemed to enjoy exceedingly, making himself much at home, paddling in a pan of water, and indulging in a bath once or twice a day. After preening and spreading his long wings, he would sometimes fly across the aviary. Things went on very well until the introduction of a pair of young hawfinches, and as they were just beginning to fly, they were often hopping about the bottom of the aviary. The lapwing treated the youngsters anything but courteously, for as soon as the finches approached the sop-bread, he raised his crest and uttered a succession of cries, leaving out the latter part of his usual call; at the same time running at the legs of the young birds, sweeping his bill along the ground after the manner of the common duck, evidently with an intention of taking the intruders, as he considered them, by the leg; the poor finch gave a piercing cry and got quickly away. In consequence of this rough treatment, the crested bird was removed to another aviary, in which carrier pigeons are kept, where I expected he would cause quite a sensation; but not so, the pewet walked about and made himself at home, and the pigeons seemed unconcerned. Things went on very well until a few crumbs of bread were given to the plover. Pigeons have an appetite for bread, and evidently intended to share the meal with their new companion; but he showed a decided opposition, by pulling the feathers out of the pigeons as soon as they approached the crumbs. After a few days the carriers began to turn round, but it was of no use, they could not understand the lapwing's manner of combat. What with his noise and rapid succession of attacks, the pigeons retreated with the loss of a few feathers, and although not much hurt, they were decidedly confused.

CHAS. J. W. RUDD.

PISTILLODY.

ALTHOUGH so much has been written about abnormal forms of plants, and though the study of them has been reduced to a science, there is always something turning up which, if not absolutely new, is at any rate highly interesting, and, as such, is worth recording. Perhaps, amongst the most curious and *unexpected* examples one meets with are those in which male organs become transformed into female, and *vice versâ*. We used to be taught to consider that a theoretically perfect flower should consist of stamens and pistils surrounded by the perianth; because such a *combined* arrangement was the most certain to insure fertilization. Now, however, when so many wonderful facts connected with cross-fertilization have been brought to light, we are almost constrained to believe that those flowers are the most perfect which have lost the hermaphrodite condition, and bear their stamens and pistils in separate flowers, because in them self-fertilization is an impossibility. We used also to think that when a flower became unisexual it was by the suppression of one set of organs; that in a female flower the stamens, which, in a theoretically perfect flower, ought to have been there, were suppressed; whilst, in a male flower, the pistils were lost. Perhaps this is the usual process which Nature adopts in making unisexual flowers, for we can, not unfrequently, detect the rudiments of the suppressed organs; but flowers occasionally become unisexual by the actual conversion of stamens into pistils, or of pistils into stamens; and though it is only in monstrous specimens that we *observe* the strange transformation, it is quite possible that the monstrosity may have become the habit in certain species. Scientifically this peculiar phenomenon is called, as the case may be, "pistillody of the stamens," and "staminody of the pistils."

I described a wallflower some time ago, in which pistillody of the stamens had taken place. Since then I have met with a still more curious example. I have growing at the present time two plants of Nasturtium (*Tropæolum majus*), which catch the eye, in the first instance, on account of the apparent absence of petals. On closer inspection, it is seen that the petals are there, but that they are reduced to the size, shape, and colour of the sepals. Both plants are covered with these little, apparently double flowers; so that it is probable that the two seeds from which they were produced came from a similar plant. In one flower only there is one petal properly developed, which points straight downwards, giving the flower a strange aspect.

But not one of these flowers contains any stamens. Those organs have all become pistils. But even this is not all; for either the true pistils are absent altogether, or the stamen-pistils have arranged themselves in the same whorl with them, and the result is a complete ring of ovaries, exactly as we have them in the Mallow. This is particularly interesting, for the Tropæolums are placed in the Malva Alliance; and the order Tropæolaceæ is not very far removed from Malvaceæ; but here, in this strange, monstrous nasturtium we have the relationship made more evident by the ring of seeds at the base of the transformed stamens.

ROBERT HOLLAND.

LINNÆA GLUTINOSA.—Last month (August) I took several specimens of this river snail in the Brusna, King's County. I cannot find it mentioned in Mr. Thompson's "Natural History of Ireland," though I hardly suppose it is new to that island.—*C. Ashford, Grove House, Tottenham.*

PUBLIC INSECTARIA.

THE suggestion of Mr. W. M. Macpherson is of the utmost importance to all lovers of Natural History, and many must regret the absence of an "Insectarium" at the Zoological Gardens, Regent's Park, of that interesting department—Entomology—which is inferior to none.



Fig. 141.

Could an Insectarium be erected, it would afford to the amateur Entomologist an opportunity of studying the various insects, with their wonderful transformations, disclosing a succession of phenomena in some instances more striking and beautiful than can be imagined.

I think that a house to hold the various "vivariums" could be erected upon a horticultural principle, no amount of light and sunshine being too much for butterflies, &c.

I beg to annex a drawing of an insect vivarium, which is considered sufficiently adapted for the rearing and keeping of insects. As some insects require water, an aqua-vivarium could be constructed upon the same principle, the upper part being made to lift off from the aquarium, which could only be done when none of the insects are on the wing. One side of both structures should open like a door, to allow the interior to be cleaned and arranged when necessary. The water need not occupy the whole area of the bottom, but be made to represent the irregular shores of a mimic lake, round which can be grown the ferns, grasses, &c., the various insects require. Short, close-growing grass is a most important thing to produce; but the different sorts of food depend on the different insects each vivarium contains.

The vivarium and aqua-vivarium must be kept scrupulously clean, and, above all, let the ventilation be perfect. Plants at night give off carbonic acid gas, which, if there is not ample opportunity for it to escape, would soon kill the insects. This can be avoided by having perforated zinc at the top of each vivarium, and some at the side near the bottom, thus insuring a continuous current of air through each structure.

Those who make Entomology a study will doubtless find the vivarium and aqua-vivarium a valuable acquisition.

THOMAS C. OBORN.

Tangley Park, Worplesdon, Surrey.

ZOOLOGY.

SPIDERS.—Spiders are spread over well nigh every portion of the globe; but it is chiefly in the tropics that we find species of large size, of strange form, or of brilliant and varied colours. The members of the lovely genus Argyopus, remarkable for the brilliancy of their silver and golden livery, and the species of Gasteracantha, whose bodies are studded with long hard spines, are found only in the hottest regions of America, Asia, and Africa. The kinds most frequently met with in the North belong to the genera Thomisus, Lycosa, Clubiona, and Tegenaria, most of which pass their lives in dark places or under stones. But the spiders which are most prettily marked are such as spread their nets in the open air—the species of Epeira, Thomisus, and Sporassus, which frequent flowers. On the other hand, the Tegenariæ, Clubionæ, and Lycosæ, which inhabit sombre spots but little exposed to the sun's rays, are invariably of a brown or greyish hue.—*Blanchard, Dictionnaire Univ. d'Hist. Nat.*

ANT GUESTS.—There are several species of beetles which are never seen in any other localities than ants' nests; and, until their singular mode of living was discovered, were ranked among the rarest of our insects. No less than thirty-seven species of ants'-nest beetles have already been acknowledged, besides the larvæ of three other

species. One very rare species of the Staphylinidæ, or Cocktail beetle (*Atemeles emarginatus*), has now become quite common, so frequently is it found in the nest of the ant. The locality of this beetle was discovered by a collector, who saw an ant carrying one of the beetles into its nest. As to the beetles themselves, they seem to be quite as much at home as the ants; and, when the nest is laid open, their first attempt is to escape into the furthest galleries, or to hide themselves in the nearest crevice. The ants, however, watch them carefully, run after them, seize them in their jaws, and carry them back again into their nests.—*Wood*, "*Homes without Hands*."

The Firefly in Canada.—The Firefly (*Lampyris corusca*) illuminates our summer nights with its radiance. When I came up the country from the St. Lawrence, travelling late one evening, I first saw these pretty insects. The light you see is of a yellow colour, like that of flame, and very different from the blue gleam of our English glow-worm. From this circumstance I at first took them for candles in the woods, and though told what they were, at every one that appeared the same idea would come across my mind, that it was some one in the woods carrying a candle, until I became more familiar with them. Even now, if I see one suddenly, without having expected it, the impression momentarily recurs. They more frequently fire out the light while flying than when crawling or resting, though we may often observe the intermittent gleam as one crawls up a stalk of grass or rests on the leaf of a tree. They fly slowly, and as they fly, emit and conceal their light with great regularity, at intervals of two or three seconds; making interrupted lines of light through the air, gleaming slowly along for about a yard, then suddenly quenched, and appearing again at the same distance. The insect is a pretty beetle, with soft elytra of a light brown colour, marked with red, and handsomely striped. The light proceeds from the last three segments of the abdomen, which are of a delicate cream-colour by day. At night these three segments are bright at all times, but at the regular intervals I have mentioned they flash out with dazzling splendour. If this part be plucked off and crushed, many patches of brilliance occur for a few moments among the flesh, but they gradually die away. In summer evenings they often occur in great numbers, especially over wet and marshy ground: I have seen the whole air for a few yards above the surface of a large field completely filled with them, thicker than the stars on a winter night; and flashing and disappearing, every one moving about in their mazy evolutions,—it is really a very beautiful sight. It is commonly believed these numbers precede rain. Notwithstanding their abundance, they are not often seen by day. They are known here by the name of lightning bugs.—*Gosse*, "*Canadian Naturalist*."

Blister-Fly.—On the 16th of June of this year I captured a single specimen of the elegant Blister or Spanish-fly (*Lytta vesicatrix*). It was crawling lazily over a rose-bush, after the manner of its kind, in the early morning. This beetle—for beetle it is, in spite of its common name—is, I think, sufficiently rare to warrant a record of its capture in the pages of Science-Gossip.—*W. W. Spicer, Itchen Abbas*.

Rhagium bifasciatum.—I cannot understand how your correspondent "J. L. C." (S.-G., 81, 215) has found any difficulty in getting a description of *Rhagium bifasciatum*. I imagined it was described in all works giving characters of the species of British Coleoptera. In any I have seen it is mentioned. *R. bifasciatum* is one of our common longicorns, and it is much more often met with than the allied species, *R. indagator* and *R. inquisitor*, though the latter is not rare, at least in Scotland. It feeds as a larva in fir wood, always in decaying trunks or branches, in which the large maggot-like larva may be frequently and abundantly met with. I have found fifty or sixty in a small portion of a decaying branch of a Scotch fir. The perfect insect is generally most plentifully to be found in September and October, though I have met with it at most times of the year. I take the following short description of it from the "Entomologia Edinensis," which happens to be by me:—"Brownish black, shining, elytra with two oblique abbreviated testaceous yellow fasciæ. The external margin and apex of the abdomen rufous, ♀ 9—10 lines, ♂ considerably smaller." I have found the perfect insect generally in the wood, but sometimes taking a wider range, and examining the bloom of ragwort; by which I mean *Senecio*, and not *Tussilago*.—*W. D. R.*

Retentiveness of Memory in a Wolf.—In the year 1867, during a sojourn at Clifton, I struck up a great friendship with a wolf confined in the Zoological Gardens. He became so attached that he would allow me to caress him through the bars of his cage, to place my hands in his mouth, and, in short, he played with me exactly as a dog would, much to the surprise and amusement of the by-standers, a crowd of whom I have often caused to start by simply whistling from a distance, when the wolf would leap violently against the door of his cage, and make frantic efforts in reality to get at me, although to the spectators it seemed as though he was only bent on sanguinary thoughts towards themselves. That the animal's attachment was purely personal is shown by the fact that a friend of mine, desirous of emulating my success, got rather a nasty bite for his pains. After a while I left Clifton, and did not return until May in the present year. One of my first visits was to the Zoological Gardens, and I at once set to work to test the wolf's affection and retentiveness of memory

by whistling in a low tone at as great a distance from its den as allowed of my watching its movements. At the first sound the animal, which before was "loafing about" in a listless manner, raised its head and listened, and, on my continuing to whistle, it bounded against the bars with every mark of joy. Long before I reached the cage he recognized my footsteps, and strove to engage my attention by whining and throwing himself into all kinds of queer positions. My welcome, in fact, was of the warmest kind, and I left him with, I was going to say, *mutual* expressions of sincere regret; for if ever an animal gave expression to its feelings, it was this poor wolf, who recognized me after so long an absence.—*W. W. Spicer, Itchen Abbas.*

Swallows Building on Cliffs.—During a walk in the neighbourhood of Havre, in August, I was much struck with the manner in which the Martins (*Hirundo urbica*) utilize the cliffs which border the river Seine on its northern bank for the purpose of nidification. These cliffs, lying between Orches and Tancarville, are of limestone origin; they rise to a height of some 200 feet with a nearly perpendicular section, interrupted only by slight projections here and there; and all along their upper part are dotted over with an enormous number of martins' nests, the birds themselves wheeling through the air in hundreds, in search of food for their young. A safer or more secure spot it would be difficult to imagine. Similar instances have been recorded in this country by Yarrell and others, but I believe they are by no means common, the usual resort of the martin being human dwellings.—*W. W. Spicer, Itchen Abbas.*

Parasites on Arge Galathea.—In a plantation on the now famous Tichborne estate I every year take large numbers of the Marbled White butterfly (*Arge Galathea*), and in many of the specimens I find a quantity of minute insects of the brightest scarlet; so small, indeed, are they, that it requires a sharp eye to detect them. Now, at the time of year when Galathea makes its appearance, the detestable *Acarus autumnalis*—it is popularly called the Harvest Bob here—makes its hated appearance all too clearly perceptible on our poor legs; and I never can visit this particular wood to search for entomological specimens without suffering acutely from its attacks. Doubtless some of the many readers of Science-Gossip will be able to give me some information whether the little red things I have observed are acari, and whether they derive nourishment from the juices of the butterfly, as they do from the blood of the unfortunate entomologist. There is one thing I think very remarkable—plentiful as I find it in Galathea, I have never detected its appearance in any other butterfly.—*Joseph Anderson, Jun., Alresford, Hants.*

Vampire Bat.—Rising before dawn the next day, we found from the blood-clotted hides of our animals that they had suffered severely from the vampire (*Vespertilio naso*, or *Phyllostoma spectrum*)—a phyllostoma locally called by the generic name of Morcczo andira or Guandira. These big, ruddy brown bats, of ghostly flight and cannibal tastes, are confined to the American continent. They seem to select the neck, shoulders, withers, and hindquarters of animals—in fact, to attack where they can least be disturbed. When a "raw" exists, it is chosen before other places. The muleteers declare that the phlebotomy does no harm. I remarked that it always enfeebled the patient. Messieurs Bates and A. R. Wallace, and my excellent friend Mr. C. H. Williams, of Bahia, suffered in person on the Amazons, where the Rhinophyll appears to be decidedly anthropophagous. All the party of three were phlebotomized in the big toe during a single night. Mr. Williams felt the bite of the brute, and found a puncture about one-eighth of an inch in diameter.—*Burton, "Highlands of Brazil."*

Woodlark.—This truly melodious singer lives in the neighbourhood of Nansladron all the year round; but, as far as I have hitherto noticed, it appears to be very capricious in giving vent to its sweet notes. Sometimes it will sing every day for weeks together, and then will remain silent for an equally long period; whether it be summer or winter, these fitful gusts of joy and sadness seem to come over it. Of course, like every other sensible bird, it prefers sunshine to clouds and rain; but when the heart becomes full, at whatever season of the year, it does not appear to be very particular about the weather, for often on the coldest days of winter it will make the welkin ring again with the roll of its sweetest strains. The Rev. F. O. Morris says it is a rare bird in Cornwall; but I can speak for a circuit of many miles, and considering that it is not a plentiful bird anywhere, our woods and fields contain a good sprinkling of them; and if the other woody parts of this country are favoured with an equal number, it cannot be considered rare by any means. Colonel Montague says it occurs more frequently in Devonshire than any other part of Great Britain, and as the climate of Cornwall resembles that of Devon, we should almost expect, what I find to be the fact, that great numbers do make their habitat amongst us.—*Joseph Drew.*

Bird-Music.—In this musical age it has often struck me as remarkable that so few, even of the educated classes, regard the songs of birds. Very certain I am that if the uninitiated only knew the rapturous pleasures they miss, they would begin, however late in life, to admire the choristers of heaven, and so taste the calm joys of the country

and the soothing influence of bird-music. How many fair ladies there are who can tell you the style of any musical composer, living or dead, but who know so little of God's sylvan performers, that they still believe Jenny Wren to be the wife of Cock Robin; and how many gentlemen exist who have heard and will remember every celebrated player upon wind or stringed instruments, who could not distinguish the song of Thrush from Blackbird. I do not venture to blame ladies or gentlemen when following the bent of their æsthetical tastes, but at the same time I do not hesitate to tell them, that in preferring man- to bird-music, they place the comparative before the superlative, and choose that which, from its artificial surroundings, is very often prejudicial to health, instead of that music which must be sought in the open country, and which, whilst entrancing with genuine melody, tends to develop a healthy mind in a healthy body. I would observe, too, that whatever the taste or age of the individual, it is certain to be gratified; for should the votary be young, and filled with all the aspirations and castle-building of youth, let him listen to the Skylark, Wren, or Hedge-sparrow, and his highest flights of imagination will be lost in wonder and praise. Is he of middle age, when experience has modified the visions of former years, let him be melted with the notes of the Woodlark, Blackbird, or Blackcap, and any tinge of disappointment or sadness will be lost in the round volumes of music; and should he be even of advanced years, *nunc exacta ætate*, the Robin, Wood-pigeon, and many others will make him feel, by their plaintive strains, that even the denizens of the wood show the warmest sympathy with man in his gradual descent towards the Silent Land:—

> "There is in souls a sympathy with sounds,
> And as the mind is pitch'd, the ear is pleased
> With melting airs or martial, brisk or grave:
> Some chord in unison with what we hear
> Is touched within us, and the heart replies."

From the extreme joy I have ever found, and still do find, in observing the beautiful hues of birds, watching their amusing manners, and listening to their melodious songs, I do sincerely hope these few remarks may induce some of the readers of Science-Gossip to devote a part of their spare time to them, and taste a pleasure free from all alloy.—*Joseph Drew, Nansladron.*

Large Tortoiseshell (*Vanessa polychloros*), &c.—This butterfly, which is generally considered a rare insect in this neighbourhood, has been taken here (Norwich) in several instances this summer. I hear from several of my friends that they have taken specimens. One of them asserts that, whilst out walking a few miles from here, he saw over a dozen specimens, but not having his net with him, he was unable to capture any. Whilst out for a walk on Sunday, Aug. 13th, I saw a female alight on the trunk of an elm-tree; I had no net at the time, but approaching it cautiously, I succeeded in picking it off with my fore-finger and thumb, and it proved a very fine specimen. Scarcely had I secured it ere another specimen alighted on the very identical spot, which I, however, failed to capture. In the absence of a box, I pinned it inside my hat, and got it home in good condition. I also captured another specimen whilst out entomologizing on Aug. 16th. The generality of butterflies, I find, are scarce here this season; but I cannot help noticing the extraordinary abundance of the Large Cabbage (*Pieris Brassicæ*), the males by far outnumbering the females.—*R. Laddiman, St. Augustine's, Norwich.*

Deiopeia pulchella at Brighton.—While walking across a stubble-field to the west of Brighton, my brother from Cambridge, who is a non-entomologist, started an insect, which flew by and settled within a few feet of me. I was so struck with the appearance of the creature on the wing that I uttered an exclamation, "Why, that's a great rarity!" Any of your readers who have ever been in a similar situation will understand my wild excitement while a net was being taken from the pocket and fixed. It proved, upon being secured, to be a magnificent specimen of *D. pulchella*, which, judging from the brightness of its colouring, had but recently emerged. It was shown alive to several entomological and other friends, who were delighted to see so beautiful an insect alive. I forgot to mention it was taken at 10.15 a.m. Last evening my friend Mr. Goss called on me, bringing Mr. Gorringe, of Richmond-buildings, with him, who had that afternoon, about three o'clock, taken a specimen of *D. pulchella* on the Race Hill. It was still alive, but somewhat worn, as though it had been out some days. It is rather singular that on the last occasion when *Pulchella* was captured near Brighton, two were taken.—*T. W. Wonfor, Brighton, Sept.* 12, 1871.

The New Elephant Parasite.—Mr. Walker, in creating the genus *Idolocoris* for this insect, is apparently unaware that the name is already occupied, having been applied to a genus of Hemiptera Heteroptera by Messrs. Douglas and Scott, in their "British Hemiptera," published in 1865. As, of course, the same name cannot be used for two different genera in the same order (or, for that matter, in the class Insecta), *Idolocoris*, Walker, must give place to *Idolocoris*, D. & S., and some other generic name be used for the Elephant Parasite. I therefore propose the name *Phantasmocoris*. I should not have written to you on this subject had I not seen, from Mr. Richter's note in the September number, that the name *Idolocoris* has not been withdrawn.—*F. Buchanan White, M.D.*

BOTANY.

A Protest.—I cannot but protest against the practice of inserting the particular locality of some rare and cherished native plant for the benefit of those whose first object would be to secure, for their own selfish gratification, the plant, root and all. We must look to you to perform the duty of conservators as far as may be in your power. Now it is somewhere about twenty years ago since I had the gratification of viewing a Bee Orchis, and that in North Somersetshire, and I would rather forego the same pleasure for the remainder of my days than that one single plant should be wantonly plucked from its native soil only to pine away and die. *I* know a wood, too, in Somerset where I could pluck an armful of the Butterfly Orchis, so sweetly perfumed; but I only let a friend or two into the secret, who I know will not do anything worse than pluck a head or two for their parlour vase, where it will scent the room for five or six days. I wish I could feel "J. S. William Durham's" communication were a hoax.—*Chas. Delaney.*

White Varieties of Flowers.—Seeing in Science-Gossip some notices of white varieties, I may mention that I have found the following albino specimens this season:—*Agraphis nutans* and *Ajuga reptans*, a specimen of each. *Geranium Robertianum* in plenty, growing with the typical form. In this case the whole plant partook of the albino character; for the leaves were very pale green, instead of reddish, as is usually the case. *Onopordum acanthoides*, many specimens. In all the above cases the typical forms were close at hand. Your correspondent "R. B. S." (p. 201) seems to think albinism more especially connected with calcareous soils, which I think probable; but the above were all found in the Wealden district of Sussex, where the soil is clay and sand.—*J. H. A. Jenner.*

Pitcher-Plants.—The most curious, perhaps, of all the pitcher-plants at present known is one which has hitherto only been observed in India, growing in its native forests: it is called *Dischidia Rafflesiana*. It is a creeping plant, having a long, twining stem, which is destitute of leaves until near its summit; and this may be a hundred or more feet from the roots, on which, therefore, it can scarcely depend for nourishment by absorption of fluid from the ground. Its supplies of moisture from a tropical atmosphere would be very uncertain if there were no provision for storing up what it occasionally collects; but with such a one it is furnished. The pitcher seems formed of a leaf with its edges rolled towards each other and adherent; and the upper end or mouth from which it is suspended is quite open, and adapted to receive whatever moisture may descend from the air, whether in the form of rain or dew. It is accordingly always found to contain a considerable quantity of fluid, in which a number of small black ants are generally seen. These are probably attracted by it, and their decomposition may, as in the case of the Sarracenia, render it yet most nutritious to the plant.

But the most curious part of the whole apparatus is a tuft of absorbent fibres resembling those of the roots: these are prolonged from the nearest part of the branch, or even from the stalk, to which the pitcher is attached and spread through the cavity. They may be regarded in the light of secondary roots, serving to introduce into the plant the fluid collected in the curious reservoirs, which may be compared to the stomachs of animals.—*Carpenter*, "*Vegetable Physiology.*"

Transmission of Plants by Post.—Specimens of living plants are often sent to me by post; and many of these, although they may only have been a day upon the road, arrive in a state of partial decomposition, from the fact of too great an amount of moisture having been packed up with them. Many people put plants into small tin boxes, with a wet rag, or a piece of saturated blotting-paper, above and below them; and I fancy the plants themselves have often been dipped in water as well. This superabundance of wet is not only unnecessary, especially in *tin* boxes, but it rots the plants. Flowers are more injured than leaves; but both turn brown and die directly they are exposed to the air. The best way to send plants is undoubtedly in tin boxes; but the plants should be put in when *perfectly dry*, and as soon as possible after being gathered. Many plants will thus keep fresh for several days; but, if they should be somewhat faded, they will generally revive in water; whereas, a plant that has been packed up wet will seldom, if ever, do so. Tin boxes, however, are very heavy in a letter, and many people prefer to send specimens in card boxes. When this is done, it is best to close up the opening of the box with a strip of gum paper, which prevents too much evaporation from the plant. Even in card boxes I would put no wet paper; but if it is thought necessary to keep the specimen moist, a small bit of wet rag, or sponge, or moss, tied round the cut end of the stalk, will be found to answer every purpose.—*Robert Holland.*

Trifolium stellatum.—In Rutter's "History of Somersetshire" it is stated that *Trifolium stellatum* grows in the vicinity of Walton-in-Gordano, near Bristol. I have lately sought for it in that neighbourhood without success. Can any of your readers confirm that assertion, or has any one found that extremely rare plant anywhere in England, except in the only locality given in the various Floras; *i. e.* Shoreham, Sussex?—*H. E. Wilkinson, Penge, Sept.* 11.

MICROSCOPY.

Furze-Mites (vol. 1868, p. 49).—I found a colony of these curious little animals last week on Weybridge Heath, on some furze between the station and the gate leading into Mr. Locke King's property. One of the furze-bushes was partially enveloped in the thick web, and the points of the shoots were red with the numbers of mites located upon them. I was too hurried to be able to see whether the characteristic green specimens were present.—*W. W. Spicer, Itchen Abbas.*

Scale of the Pike (*Esox lucius*).—During the year 1866 we figured the scale of the pike (fig. 71); but, since then, we have figured so many of the scales of our British fishes that we look with less satisfaction on the scale there engraved, and, con-

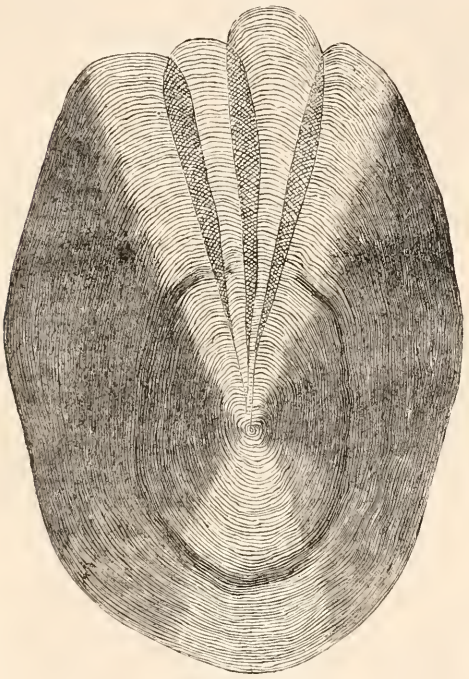


Fig. 142. Scale of Pike.

sequently, have now added the pike to this latter series, not only larger, but, as we think, better done. The few remaining of our British fresh-water fishes we shall be glad to add to this series, as soon as we obtain authentic scales.

Slides for Opaque Objects.—We have received from Mr. H. P. Aylward, of Manchester, a sample of wooden slides which he has prepared for mounting opaque objects. These slips are of hard wood, 3 × 1 inches, with a countersunk cell, of variable size. The upper edge of the cell is grooved for the glass to fall in, and this is fixed in its place by means of an adhesive paper ring. The slides are neatly finished, and when the object is mounted it has a very neat appearance. The slides are finished so as not to require papering, and, we doubt not, will form a useful adjunct to the materials of the amateur mounter. Further particulars may be obtained from the designer of these slides, at No. 15, Cotham Street, Strangeways, Manchester.

Microscopists who are tired of their own round of objects and observations, will find during the autumn some very pretty little cup-shaped fungi, mostly hairy, and often yellow, growing on the old excrement of various animals, as the horse, cow, ass, rabbit, sheep, &c. These are just visible to the naked eye, of a fleshy substance, and may easily be made to show their internal structure by pressure on the slide. The sporidia, when fully matured, are very often of a beautiful amethystine purple. These objects are described under the name of *Ascobolus*, and may be mounted in the same manner as described for *Peziza*, in a communication made at the August meeting of the Quekett Microscopical Club. Though found in such company, the collector need be under no apprehension of anything disgusting, since the excreta become old and washed before the *Ascoboli* make their appearance.

What to look for.—Will botanists, when out on their excursions, look for the following microscopic fungi:—A brand or *Puccinia* on the leaves of the common tansy (*Tanacetum vulgare*); a parasitic fungus on the leaves of *Bupleurum;* a cluster-cup (*Æcidium*) on the leaves of *Parnassia palustris;* an orange rust on the leaves of *Empetrum nigrum;* a brand (*Puccinia*) on the leaves of *Chrysosplenium oppositifolium*, hitherto only found by Dr. Greville; a bright orange *Uredo* on the leaves of *Euonymus europæus;* a rusty *Puccinia* on the under surface of the leaves of *Arctium lappa;* similar rust on the leaves of *Polygonum Bistorta;* a *Puccinia* on the leaves of *Sedum Rhodiola;* and a parasite, much resembling an *Uredo*, on the leaves of the common houseleek. If any of these are found, will the finder of them send specimen and particulars to the "Author of the 'Handbook of British Fungi,'" at the office of this journal.

Amplification.—Great advantage would it be if microscopists would invariably put under every diagram of objects the number of times magnified. In many cases, especially perhaps in Mr. Gosse's work, "Evenings at the Microscope," do I find sketches of objects seen which are, after all, only within reach of those who own the very highest powers—not to be seen by those who possess objectives of only, say, 300 diameter power. To those who have a good microscope with 1-inch and ¼-inch objectives it is tantalizing to see pictures of objects to see which the very high powers are required; and frequently, perhaps, the young microscopist tries to see what is figured in the book and is utterly disappointed and disheartened.—*F. A. F.*

NOTES AND QUERIES.

Bait for Soles.—Can any of your readers tell what bait soles will take? I often fish where soles are plentiful; but though we take almost all other kinds of fish found near the coast, we never catch soles; and yet if we trawl over the same ground with a net, we catch plenty. The baits used are generally sand-eels, or the worms found in the sand-banks when the tide is out.—*C. L. J.*

Is it the Squirrel?—Is it not a pity to promulgate against one of our most beautiful little animals so serious a charge, upon evidence so unsubstantial as that of your correspondent under the signature of Barbara Wallace Fyfe, p. 189, No. 80, August, 1871? The lady herself does not profess to have had personal proof, or even to have heard before of the damaging accusation, only a gentleman remarkable for susceptibility for the feelings of all animal life, those of the female of his own species apparently excepted, brought to her feet a bleeding misshapen mass, "the exquisite native of our woods," with whose activity and agility she was at the very moment enraptured, exclaiming, "I am sorry you have shown it me; the squirrels have eaten so many of my pheasants' eggs;" making her the betrayer to death of the object of her admiration. We hear of no ocular or circumstantial evidence the gentleman had experienced as to the fact; and the keepers seem to be in no better case. "The eggs suffered very much from their depredations last spring, and the keepers had great trouble with them" (the squirrels). A ghost story would not go down upon such evidence as this. Look at the chain. A lady writes: "A ghost has been at mischief; she saw it? No; a gentleman told her. Did he see it at work? No; the gamekeepers told him. Did the gamekeepers witness this act? No; but depredations were frequent; so it must be the ghost." With all our social science, anomalies will cling to the world; commodities are purchasable, which nobody ever thinks of selling. The old hedgehog is dead, nailed to a barn, years ago, among other "vermin," still depredatious go on, and there is nothing now left but the squirrel. It may be asked, if the Thrush can hold its own against the Squirrel, what were Mr. and Mrs. Pheasant (one blow from whose beaks could break a squirrel's back) about to permit these depredations?—*George Cox.*

British Jelly Fishes.—"W. B. L." wants to know of some manual containing descriptions of all the British species.

The Small Eggar (*Eriogaster lanestris*).—In accordance with my promise in the September number, I now relate the fate of my larvæ of the above moth, this season. The brood, forty-seven in number, were found on June 22nd and taken home the following day. They were nearly all full-grown, and, with the exception of four, had changed skins for the last time, and were in the rich brown and golden substance which makes these caterpillars so conspicuous when feeding gregariously on the hedgerow. I dispersed them in three separate breeding-cages, each on a different principle, and for a few days all went well. However, on July 6th one died; and on the next day three more. In this manner they dropped off, a few each day, until the 27th, when all that remained were two sickly larvæ and three cocoons. The latter I opened a few days ago and found they were but coffins; for the larvæ inside were defunct. The disease is certainly not the ravages of true ichneumons, for I could not find traces of them in the several larvæ I dissected; even when placed under a low power of a microscope and carefully examined, no parasites were visible. The intestines were shrunk and dried up in some instances, but not destroyed in any of the larvæ. I agree with Mr. Clifford in thinking it must be a disease which thins down this interesting species; but although it is a delicate larva, I see no reason for its rapid destruction in captivity, and the cause of the singular mortality has yet to be discovered.—*J. Henderson, Reading.*

Protective Resemblance.—Some birds are screened from the pursuit of their enemies by an arrangement of colours happily assimilated to the places which they most frequent, and where they find either food or repose. Thus the Wryneck is scarcely to be distinguished from the bark of the tree on which it feeds; or the Snipe from the moist and mossy ground by the springs of water which it frequents; the Great Plover finds its chief security in stony places, to which its colours are so nicely adapted that the most exact observer may be very easily deceived. The attentive ornithologist will not fail to discover numerous instances of this kind, such as the Partridge, Plover, Quail, &c.—*Bewick, "Introd. British Birds."*

Kestrel's Egg.—On attempting to wipe off some dirt from the egg of a kestrel (*Falco tinnunculus*) which recently came into my possession, I found that the colour came off. The Rev. F. O. Morris mentions a similar instance in his "Nests and Eggs of British Birds," and I am also told that the same thing occurs with regard to the Hobby (*Falco subluteus*). Is this generally the case?—*C. H. G.*

Goldfish.—In the beginning of June last I purchased two small goldfish, and soon after placing them in a globe, containing not more than one gallon of water and a fine healthy plant of the *Valisneria spiralis*, I observed that one of the fish had lost quite half the caudal or tail-fin; this has since grown, and the tail is now quite perfect. The water has not been changed since June.—*J. R.*

Anecdotes twice told.—As "Helen E. Watney" affixed her name to the "anecdotes" in "Country Life," as well as to those in Science-Gossip, she could scarcely have supposed that "J. J." intended to accuse her of "cribbing." If she will refer to the editorial note on p. 81 of Science-Gossip for 1865, she will see the editor's objection to "crambe repetita." There are other discrepancies in the two versions of the anecdotes which it is not necessary to particularize. A reference to Science-Gossip, 1867, p. 179, and "Country Life," 1868, p. 237, will show a second, though less obvious, case of "twice-cooked cabbage."—*J. J.*

Pelopæus, or Sand-wasp.—An American genus (Pelopæus) is called the Dauber, from its singular habit of placing its nest of mud against the walls and ceilings in the interior of houses. When finished these nests look like handfuls of clay which have been thrown up at random and adhered; but inwardly they contain very smooth and regular cells, each containing a grub and a dozen or more of spiders. The construction of these nests, which we

have observed with great minuteness, is performed by the Dauber bringing little pellets of clay in her mouth, about as large as peas, one after another, which she spreads and arranges with her jaws. Previously to closing up, she lays an egg in the bottom, and places over it from twelve to eighteen spiders, not killed, but rendered helpless. The grub spends its life in this dark and solitary prison, and when full-grown, having eaten the abdomens of all, or nearly all, the spiders, forms an oval cocoon of a brittle substance, and goes into pupa. The perfect fly, when evolved, gnaws its way through the mud-walls with its strong jaws, and for the first time beholds the light.—*P. H. Gosse*, "*Introduction to Zoology*."

Cells in Coleus.—I have been examining the variegated leaves of Coleus. Having removed the cuticle by boiling them in potash, I found very curious coloured cells in the tissue of the leaf. These cells have all the appearance of unicellular algæ, such as Protococcus. There is a hyaline margin, and the protoplasis within is divided into several, generally four, parts. They are very interesting under a high power, and vary in shade from yellow to red. Is anything known about them? Are they algæ, or merely cells in a diseased state? And is the variegated cuticle produced by them, or are they coloured by the cuticle?—*T. House*.

The Woodruff.—I was much surprised, as may also be the readers of Science-Gossip, to find the Woodruff (*Asperula*) described as a bird, thus:—

> "High soars the lark to greet the morn,
> The *woodruff* softly calls its mate."

This couplet occurs in a piece of verse entitled "The Wishing Gate," printed in *London Society*, p. 216. It might pass for a printer's error; but I think the author means the "ring-dove" (*Columba palumbus*), and that, missing the right name, he stumbled on its synonym, "wood-pigeon," which would have made his line a foot too long. He then mentally substitutes "wood-dove," and conscious of its not sounding quite right, he effaces the wrong half of the name by substituting ruff for ring.—*A. H.*

A Plague of Flies.—I have omitted hitherto to make more than passing allusion to the annoying plague of flies which still exists in Egypt to a most unpleasant extent; but I feel it is utterly impossible to convey to my readers any idea of the serious inconvenience which the perpetual attack of countless legions of flies can cause. It must be endured to be appreciated at its real value; and even with the very vivid recollections I have of the positive misery occasioned thereby, it seems to me—sitting here in peace and undisturbed, as I reflect upon it—almost incredible how much we were sometimes worried by these most tormenting insects. During the hotter portions of our tour they abounded to that extent, and were so persevering in their attacks, as to drive us almost frantic at the irritation. Occasionally we would start up maddened with the annoyance, and make a furious onslaught with our respective fly-whisks, and try to clear the cabin of our tormentors; but no sooner did we sit down exhausted and hot, than our diminutive foes appeared in undiminished numbers, and returned to the charge in vengeance for their slaughtered brethren. I believe the Nile mud, prolific of animal as of vegetable life, is the fertile bed from whence these countless myriads spring into being.—*Rev. A. C. Smith*, "*The Nile and its Banks*."

Hawks and Glass Windows.—I have known one instance of a hawk following a small bird through a glass window into a dwelling-house. The bird (a finch) fell dead outside the window, but the hawk, a larger creature, came with greater force against the glass, and dashed through one of the panes, was badly cut, secured, but died. I believe it is by no means an uncommon thing for hawks and other birds to be deceived by glass and fly violently against it.—*H. E. W.*

Names of the Borage in Foreign Languages.—I am informed that this plant is quite as often called *borrana* as *borragine* in Italy; and again in Spain it is known as *borrada* as well as *borraja*; *borretsch* in German; *bernagie* and *bernasie* by the Dutch; whereas, if you go to Poland, you will find it by the title of *borak*.—*Helen E. Watney*.

Oak Eggar (*Bombyx Quercûs*).—Perhaps the following notes relative to the time of appearance of *B. Quercûs* may interest, or be of use to your correspondent Mr. Warner, and also Mr. J. Henderson. I extract from my Diary the earliest dates that I have taken the larvæ of this moth for the last few years:—This year I took from a whitethorn three fine larvæ on April 24th; last year my first were taken on May 15th, when I took eight almost full-fed; in 1869 I took three on April 21st; in 1868 four on April 23rd; and in 1867 two on May 16th.—*R. L. N.*

Ragwort (p. 215).—Many thanks for calling my attention to the stupid mistake I made last month about this plant. For *Tussilago Farfara* read *Senecio Jacobæa*.—*G. H. H.*

Squirrel *versus* Missel-Thrush (p. 214).—The Rev. J. G. Wood, in one of his interesting works on natural history, says that numerous cases have established the fact that the Squirrel at times takes a fancy for animal food; and that it has been known to eat both eggs and young birds, and even mice, killing its live game in weasel style by a bite at the back of the neck—*G. H. H.*

Peculiarity of a Hen Canary.—I have a two-year-old hen canary, kept in solitary confinement, which has, during the present summer, laid nine eggs in succession, with about ten days' interval between each, about half of them being shell-less. Instances have been recorded of hen-birds, in such circumstances, dropping one or two; but I fancy such a number is unusual. Perhaps some of your readers may have noted a similar circumstance.—*J. R. S. C.*

The Orange-tip Butterfly (p. 208).—I have also observed that a small proportion only of the females of this species are seen on the wing; I do not know whether my own estimate would be quite the same as that of Mr. Henderson. I fancy, in my experience, the capture of females has been in a slightly larger proportion than he puts it. However, it suffices as to the fact; and it has happened in cases where the entomologist has netted all the Whites which came within reach, to make sure that none were passed by. In many instances where females are taken, they are roused from the herbage by the tread of the entomologist, and I suspect they fly very little, unless compelled. Another thing I may note,—that I have never seen these butterflies paired on the wing, which is a circumstance so usual in other species. I have a very diminutive female

in my possession, measuring barely one inch. The Orange-tip is usually regarded as an April butterfly, and so it is in many districts, but not in others. Between the north and south of London there will be sometimes a difference of a month in the time of emergence. It is a species which rarely continues out for any length of time, though in a Hertfordshire district, where vegetation is often backward, and therefore insects also, I have seen Orange-tips flying about at the end of June.—*J. R. S. C.*

Deiopeia pulchella in Devonshire.—On Friday, the 8th of September, I captured a fine specimen of that exceedingly rare moth the Crimson-speckled (*Deiopeia pulchella*), of which there are but few (British) examples known. On entering my garden, I observed a moth start rather wildly from a plant of the Heliotrope, and flying quickly for about twenty yards (not heeding any other flowers in its way), it settled on the blossom of another plant of the same kind. At first sight it had much the appearance of a small Garden White butterfly; but, from a peculiarity in its flight, I knew it must be something different, and, on approaching it cautiously, I saw at a glance what it really was, rushed into the house for my net, and captured it. When at rest, it looked long and narrow, with its wings (I think) folded round its body, giving it much the appearance of a large grass moth; and, from what I could observe of its habits, it seemed to be rather wild (or wary), and to prefer the Heliotrope to any other garden flower, of which there was a great variety. On the Continent the moth is said to be found in stubble-fields, and the caterpillar (which has never been found in this country) to feed on the field Forget-me-not (*Myosotis arvensis*).—*J. Gatcombe, Stonehouse, Devon.*

Cleaning Skeletons.—As a good deal has appeared lately in Science-Gossip on the employment of ants in the preparation of skeletons of small animals, I may mention an experiment I made some years ago on the necrophagous propensities of the common kitchen cockroach (*Blatta orientalis*), better known as the "black beetle." Conceiving that one cockroach would do more work than a score of ants, I shot a sparrow, plucked it, and laid it in a shallow tray on the floor of the kitchen in the house I then occupied. On the first night a considerable portion of the flesh was removed, laying the ribs bare; the second night more was eaten, but not so much as on the first occasion, and the third night it was untouched. Thinking it probable that the cockroaches objected to meat being too dry, I dipped the half-eaten bird into water, and the insects renewed their meal. The result was that I obtained an imperfectly cleaned skeleton, which, had it been placed in an ants' nest would, I doubt not, have been finished off satisfactorily. Employing cockroaches would have the advantage of the work being done at home and under inspection, and if a score or so were caught and kept in a basin or box they might be put on duty during the day, and so shorten the time required. Ants would probably do the final polishing more neatly than the larger insects. I also made an attempt to collect wasps for the same purpose, but they quickly died in confinement. —*George Guyon, Ventnor, Isle of Wight.*

Erratum.—At p. 184 of your August number there is a slight typographical error in a short paragraph you were good enough to insert respecting the Hawfinch. *Herefordshire* should stand *Hertfordshire.—Charles Ashford.*

Hawfinch.—As another locality in which the Hawfinch has been known to occur, I may mention that, last year, two young ones were taken from a nest built in a small wood near Hitchin, Herts, one of which was caged and successfully reared.—*W. Nash, Hitchin.*

Gnaphalium.—I shall be much obliged if any reader of Science-Gossip will tell me the best method of drying the Gnaphaliums, or Everlasting Flowers, so that in the winter they may retain the peculiar firmness which is in the Immortelles, and other Everlastings, when they are sold in shops. —*S. M. P.*

Floral Stars.—"A. E." wishes to correct an error. In writing of the flower of the *Anemone nemorosa*, the word *petals* was used where it should have been *sepals.*

Processionary Moths.—I presume I *have* made a mistake regarding the Processionary Caterpillars, which probably are Gold-tails after all. Please to understand that I am no entomologist, but only a poor unlucky gardener, and shall be very thankful to any of your correspondents who will suggest a mode of destroying these horrid pests. Should there be any nests next year, I shall be happy to send specimens, all alive and crawling, to any address.—*Julia Colson.*

Borrago (p. 214).—Thinking I had made some mistake in transcribing the words which Mr. Ernst says are erroneous, I was led to consult several dictionaries, and I give the results of my research. For his Italian *borraggine*, I find *Borragine, Borrana*, Florio ("Worlde of Wordes," 1598); *Borrágine*, Baretti (edition 1854); *Borrace, Borragine, Borrana*, "Vocabolario degli Academici della Crusca" (1729); for his Spanish *Borraja*, I find that Baretti (1786) and Caballero ("Diccionario general de la Lengua Castellana, 1856) give the same; but there is *Borráxa*, Connelly and Higgins, Dict. (1798), and *Borraxa*, the Dictionary of the Spanish Academy (1726). It seems that the botanical work I consulted was wrong in giving *Burraja*, which has a very different meaning. In the matter of the Portuguese form, of course, Mr. Ernst is correct; though, besides *Borragem*, a Portuguese dictionary (1701) gives *Borragens.* As might have been expected, Mr. Ernst's corrections of my botanical authority, in the case of the last two languages, are right; but in the case of the first, I think the authorities are equal. The only Arabic word for the plant which I have been able to find is derived by Freytag (Dict., vol. iv. 102b) (*Borago verrucosa*), from the root *lasika*, adhæsit.—*R. T., M. A.*

The Bee Orchis (p. 215).—This interesting plant I have found near this town, and also near Milborne Port, by the roadside; but I have never seen more than a few specimens in a season. A search in some of our pastures, however, would probably prove it to be anything but an uncommon plant in this neighbourhood.—*W. Macmillan, Castle Cary, Somerset.*

White Varieties (p. 191).—In walking along the road to Cole Railway station from this town, the Herb Robert, with white blossoms, is seen in abundance. White specimens of the Wild Hyacinth are not rare; and the white variety of the Sweet Violet is often more abundant than the blue. —*W. Macmillan, Castle Cary, Somerset.*

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them.

H. J. M. T.—It was simply dried up for lack of moisture. The situation was too dry.

F. H. C.—We cannot speculate on such a point. Natural history deals with hard facts and objects. We must see to know.

W. B. L.—The only work is published by Van Voorst, entitled "British Sessile-eyed Crustacea."

S. B.—See articles on "Phosphorescence of the Sea," in Science-Gossip for 1865 and 1866.

H. W.—Reptiles do not require feeding in winter.

U. S.—The question is too vague.

W. H.—Similar attacks of wasps are noted in previous volumes.

H. L. M.—We cannot possibly name a caterpillar from description.

H. P. A.—It is a pseudo-scorpion (*Chelifer*).

F. M. and J. F.—We have figured and described these galls on oak leaves in our volume for 1866, p. 228. Yet some one sends them nearly every month.

A. C.—It is the common *Scleroderma vulgare*.

F. W.—If you were a member of the Quekett Club, and went on the excursions, you would obtain plenty of these things.

R. S.—We are informed that Mr. Bolton, of Hyde House, Stourbridge, supplies microscopists with living specimens of *Stephanoceros*, *Floscularia*, &c.

W. McL.—You will obtain every information you desire of Mr. C. Collins, No. 77, Great Titchfield Street, London.

Field Clubs.—We intend publishing a list as soon as we receive titles and names of secretaries, with their addresses, in sufficient number.

E. W.—The "zoophyte" is *Diphasia rosacea*, with female capsules.

W. S. W. E.—1. No, not satisfactorily. 2. What is the author's name?

Querists will find no answer if they neglect to send name and address.

F. A. F.—We are not aware that it has been made for sale by any one.

C. D.—We cannot name with certainty. You should rear them.

C. D. (Dublin).—It is a young Goat-moth caterpillar.

M. S. H. H.—Turning them over and airing them very often, constantly moving them, keeping dry, and keeping camphor with them.

F. R. M.—The "Old Lady" (*Mania maura*).

H. H. J.—Too much shrivelled for identification.

J. D.—We will do our best to satisfy you.

M. A. J.—1. *Scirpus* (*Isolepis*) *fluitans*, L. 2. *Anthemis arvensis*, L.—*J. B.*

H. J.—1. *Leontodon hispidus*, L. (*Apargia hispida*, Wild.). 2. *Filago germanica*, L.—*J. B.*

R. B.—*Scirpus multicaulis*, Sm.—*J. B.*

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Mrs. Keating's address is to the care of Miss Motherwell, 11, Princes Gardens, Hyde Park.

Recent Plants of *Lemna polyrhiza* are wanted for dried plants, or objects for the microscope.—T. P. Fernie, Kimbolton.

For Fronds of Ferns, showing fructification, send stamped envelope and any object of interest, to G. Bowen, 95, Hampton Street, Birmingham.

Very fine specimens of *Ianthina*, with animal perfect, for slides of palates of any molluscs, except *Littorina Buccinum* or *Patella*.—R. W. Battersby, Glendalough, Corragh Lake, P.O., Killarney.

Eggs, Moths, and Butterflies wanted; 30 good objects sent in exchange.—W. Holmes, St. Faith's Street, Maidstone.

For *V. polychloros*, please send list of duplicate lepidoptera.—John Purdue, Plympton, Devon.

British Birds' Eggs for exchange, lists in return.—Address, R. G. S., Sedgefield, Ferryhill.

Paste Eels (living) offered for other good objects.—C. D., 187, Oxford Street, Mile End, E.

Fungi, Mosses, &c. unmounted, for objects of interest unmounted.—H. D., Claremont House, Waterloo, Liverpool.

Stachys germanica, *Galeopsis parviflora*, *Erigeron canadense*, *Lepidium ruderale*, &c., in exchange for other rare British plants.—Alfred French, 15, Cherwell Street, Banbury.

Polyzoa and Hydroida, exchange wanted with foreign correspondents.—E. C. J., care of the Editor.

Veronica triphyllos, *Gentiana vernu*, &c., in exchange for other British plants.—George Webster, Holgate Nursery, York.

Microscopic Slides of Diatomaceæ, &c., in exchange for plants of Beech, Oak, or Parsley Ferns, or rare English or exotic ferns.—Address, E., 8, Gatteridge Street, Banbury.

Semele, *Hyperanthus*, *Sybella* (worn), *Paphia*, *Corydon*, *Pyramidæa*, *Promissa*, *Sponsa*.—Accepted offers answered in a few days.—H. A. Auld, The Grove, Blackheath.

Lichens for Fungi.—W. Phillips, Canonbury, Kingsland, Shrewsbury.

Eggs of Crane-Fly for stamped envelope and object of microscopical interest.—J. Sargent., Jun., Fritchley, near Derby.

Soundings, rich in foraminifera, from the (two) English and French Atlantic cables, French Mediterranean cable, and Brazilian, for good mounted objects.—Captain Perry, 42, Spellow Lane, Liverpool.

BOOKS RECEIVED.

"Monthly Microscopical Journal," for September, 1871.

"Land and Water." Nos. 292, 293, 294, 295, 296.

"Journal of Applied Science," for September, 1871.

"The American Naturalist," for September.

"The Canadian Entomologist," for July and August.

"New Remedies," a Quarterly Retrospect of Therapeutics, Pharmacy, &c. Edited by H. C. Woods, Jun., M.D. For July. New York: W. Wood & Co.

"Notes on Chalcididæ." Part IV. By Francis Walker, F.L.S. London: Janson.

"Orthodox Phrenology." By A. L. Vago. London: Simpkin, Marshall, & Co.

"Life beneath the Waves, and a description of the Brighton Aquarium." London: Tinsley Brothers.

"Modern Scepticism:" a Course of Lectures delivered at the request of the Christian Evidence Society. London: Hodder & Stoughton.

"Boston Journal of Chemistry," for September, 1871.

"The Australian Medical Journal," for July, 1871.

"The Chemical News," No. 615. Student's Number.

"The Relative Powers of various Substances in Preventing the Generation of Animalculæ." By John Dougall, M.D. London: Churchill.

"The Sixth Report of the Quekett Microscopical Club.

"The Animal World," for September, 1871.

Communications Received.—A. H.—W. D. R.—H. D.—W. H.—R. L.—T. H., Jun.—H. P. A.—W. W. S.—U. S.—P. H. G.—J. H. A. J.—J. H.—H. W.—J. J.—T. B. F.—J. A., Jun.—J. J. J.—B. L.—F. H. C.—S. B.—G. C.—G. S. S.—H. J. M. T.—G. B.—C. D.—C. H. G.—J. R.—R. B.—H. H. J.—J. D.—F. R. M.—G. W.—H. J.—M. A. J.—W. M.—G. H. H.—E. A. W.—R. H.—C. D.—J. G.—T. C. I.—H. A. A.—H. C. B.—W. P.—F. B. W.—H. E. W.—R. A.—J. S., Jun.—R. G.—H. E. W.—J. P.—M. S. H. H.—J. A. P.—R. B.—I. S.—H. H. J.—R. L.—W. H.—J. R. S. C.—T. W. W.—H. R.—A. S.—J. S.—G. G.—C. A.—F. M.—S. M. P.—R. G. S.—E. C. J.—W. N.—J. C.—A. C.—H. E.—C. D.—A. H.—W. McL.—H. D.—A. F.—F. W.—A. E.

THE STORY OF A PIECE OF QUARTZ.

By J. E. TAYLOR, F.G.S., Etc.

"FACT," they say, "is often stranger than fiction." I do not think you will find this old saw better illustrated in the whole series of geological teachings than in my own history. That history is connected with one of the grandest discoveries of late years, inasmuch as it carries back the antiquity of the globe far beyond the mighty ages which had already been claimed for it. Indeed, the practical effect of this is to show the geologist that *time*, as a factor, has nothing to do with his investigations. That simple *relation* in the succession of events is all he can safely arrive at; and that his finite mind can no more conceive of the myriads of years which are included in the world's biography, than it can sum up in human arithmetic the stars and systems which crowd the illimitable realms of space! Within the last ten years a clearer geological knowledge of my origin has caused geologists almost to double the already great antiquity of the earth. At the time I mention, or thereabout, it was usually understood that the *Cambrian* period was the oldest and most primeval. The human mind is essentially conservative, and although geologists reasonably claim to be more catholic than most men, they are under the same influences. This is indicated by their unwillingness to make the world appear *older* than they possibly could help. Hence such terms as "Primary," "Primordial," &c. applied to the ancient strata—which nevertheless are all much younger than myself—are so many landmarks which have shown this tendency in the human mind. It may be, that although the geological formation to which I belong is undoubtedly the oldest known formation, subsequent research may eventually make known an older period still. The difficulty in doing so, however, will be considerably heightened by the fact of all these oldest rocks having passed through many changes, by heat and chemical action, so that nearly all traces of their former fossils are effaced, and thus they are reduced to a similarity of mineral condition all the world over.

There are few of my readers who are not acquainted with my general appearance. They have gathered me as a milk-white pebble by the sea beach, or have admired me as they climbed the Scotch mountains and saw me sticking out of the contorted rocks like a huge white rib. Or, they may have been more pleased still with the geometrical shapes which my substance is capable of assuming as a six-sided, pointed crystal. It is of my former condition, rather than of my latter, that I intend now more particularly to speak. And yet it is necessary for me to say that there are two common conditions in which I am usually to be found. One is as *Quartz*, the other as *Quartzite*. These terms are merely significant of appearance, and include little or nothing of chemical difference. *Quartz* proper is usually found in veins, having been forced into fissures when it was in a soft, heated condition. *Quartzite* has not so completely lost all its original structure, and its particles or grains may often be seen retaining their original water-worn form. Again, *Quartzite* does not occur as an intrusive rock, but in huge stratified masses, hundreds of feet in thickness. And yet you may find transitions in these two extreme states of my family—even from the transparent crystal condition of the "Brazilian pebbles" to the coarse-grained and resinous appearance of quartzite.

Let me be thoroughly understood. Although I am representing that great, and at present *oldest* epoch in our planet's history—the *Laurentian*—I should not like you to fall into the mistake of supposing that I am limited to it alone. On the con-

trary, formations of much more modern date than that to which I belong are rich in quartz veins and even beds. In short, any rock that has been exposed to the same influences that I have, if it contained the same chemical substances as myself, would also have quartz as the result. They tell me that I am chemically composed of only one substance—*Silica*. My normal condition is transparent and colourless, although I am rarely found like this except when in geometrically-shaped crystals. A milk-white colour is that which I commonly affect, and this is due solely to the rate at which my parent mass cooled down. Hence it is that geologists can more or less tell from my appearance the circumstances which attended my birth. From the pure, transparent condition I mentioned above, I pass through a great many modifications, and in each stage of these I am known by different names. But with the exception of very slight mixtures of other ingredients than this same silica, I continue the same throughout; thus, when I am of a violet tint I am called *Amethyst;* when of the colour of sherry, *Topaz;* when of a smoke-brown hue, *Cairngorm*, &c. Mixed with other chemical substances I pass into *jasper*, *flint*, *chalcedony*, *agates*, &c., in all of which you will find that at least nine-tenths of their whole bulk is silica.

Up to the time when the geological formation to which I belong had been discovered, as I before remarked, the *Cambrian* was looked upon as the oldest. But there were a series of schists, quartzose rocks, &c., which were still older than these, and which usually went by the name of *Metamorphic*, or "altered" rocks; thus committing them to no particular geological age. By many these rocks were regarded as *transitional*,—that is, as passing from an igneous to a stratified condition. When it was imagined that all the granite rocks were formed as the outer crust of a once molten globe, then, it was also thought, the rocks which came to be formed along the bottoms of the hot seas must be of a very peculiar character. In short, these mica-schist, quartz, and gneissose strata were regarded as having been deposited and solidified under such circumstances. Their absence of fossils, and proofs of having experienced great heat, were looked upon as bearing out this view. I hardly need tell you how erroneous it was. The Cambrian period was believed to be that when Life first appeared on the Globe. Now this supposition is known to be as wrong as that which accounted for the mineralogical appearances of the metamorphic rocks.

Although I am speaking only as a humble piece of quartz, you must remember, that, when I am narrating the circumstances of my life, I am at the same time giving those of the mica-schist, gneiss, and altered limestones, which, equally with myself, belong to the Laurentian epoch. Indeed, the last-named rock, greatly altered though it is in appearance, so as to resemble loaf-sugar, could, perhaps, tell you more of the vital conditions of the ancient Laurentian seas than I can. First, let me impress you with the fact that when we were formed, collectively, we did not differ in appearance from the sandstones, clays, and limestones either of the present or any bygone geological era. All this wonderful alteration in our appearance and structure is due solely to the subsequent changes we underwent. Of these I shall speak presently. If you know anything of the great deductions of geology, you will be aware that the farther you go back in time, the fewer and simpler are the forms of life which inhabited the earth. It was the general poverty of species, accompanied by their lowly organization, which caused the Cambrian epoch to be regarded as the first platform of Life. Now when you go farther back in time, to my own age, you will find that the organisms are still lowlier. Indeed, of the objects that lived in the seas where I was originally deposited as a thick sheet of ordinary sand, all that I can remember is one abundant organism, not more than an inch in diameter, now known as *Eozoon*, or the "dawn-animalcule," in allusion to its primeval antiquity. It was lowly enough organized, being little above the natural history rank of the common sponge. This marine creature lived on the sea-bottom in vast quantities, and there grew by the addition of layer on layer of younger forms, just, as I am told, is the way in which coral reefs grow in modern seas! Like the latter, it absorbed its carbonate of lime from the sea-water, and thus caused great masses slowly to accumulate. This was in the deeper parts of the sea, where the water was clear, and free from muddy sediment. But my recollection goes no farther to any animal type. No fishes swam in the blue water; no crustacean crawled over where I lay! Occasionally the rivers brought some lowly-organized vegetables in entangled masses, or sea-weeds drifted into my neighbourhood, and eventually became entombed in the sandy mud—my then condition. An impure coal was thus formed, and when the rocks underwent their great transformation by the agency of heat, this vegetation somehow or another passed into *Plumbago*, or "black-lead," as it is commonly and erroneously called. The great amount of carbon—more than there is in many kinds of actual coal—which makes up the composition of plumbago, had long indicated its vegetable origin. How lowly organized were the land plants of the Laurentian period you may guess at from the fact that many ages afterwards, during the Carboniferous epoch, they existed chiefly as gigantic club-mosses! What I have said about the vegetable origin of "black-lead" applies as logically to the origin of the Laurentian limestones. Some of the beds are as much as fifteen hundred feet in thickness, but altered throughout. As geologists are now aware,

the limestones in every other formation are always of *vital* origin—that is, they have been formed by the accumulation of coral sand and reefs, of shells, &c., cemented, perhaps, by a still greater bulk of microscopic organisms. The white chalk of Norfolk is nearly as thick as one of these beds of Laurentian limestones, and yet, to the naked eye, it offers no explanation of its origin. It is not until you have applied the microscope that you perceive it to be almost entirely built up of the shields of animalculæ, many of them of the same species as are now living in the Atlantic! If, therefore, the limestones of every known geological period have been formed by *vital* agency, one would imagine that those limestones, whose organic remains had been obliterated by the great heat to which they have been subjected, might be reasonably put down to the same origin. Again, the various *phosphates*, &c., formed in these altered limestones, plainly tell of animal life having been employed in elaborating them. But, mighty though the transitions have been through which the whole of the Laurentian rocks have passed, *all* traces of fossils have not been lost. The limestones yet contain myriads of *Eozoa*, as plainly showing they were formed by its agency, as a coral reef tells you how its bulk grew to its present size.

Twenty thousand feet of material had been strewn along the bottoms of the Laurentian seas in various places, the material varying according to its neighbourhood to the mouths of rivers, &c., whence it was brought. The solidification of this mass took place contemporaneously with its deposition. A great plutonic change then took place, and what had been sea-bottom for ages, existed as dry land. Then followed a period of submergence, when it once more became sea-bottom, and had piled over it ten thousand feet of extra material! You ask how I know all this, and I reply by pointing to you how the upper ten thousand feet of rock lie *unconformably* to the lower masses. By "unconformability" I mean that the dip of their beds is not the same, the lower being different to the upper. This plainly shows that the lower beds were uptilted before the upper were formed, and that both series partook of the movement which finally elevated the upper Laurentian beds into dry land, in which state they remained during the subsequent Cambrian epoch.

You can readily understand how the Laurentian rocks, being the first formed, must have undergone more changes than any other, inasmuch as they have had to partake of all that has gone on since they originated. It is a wonder that we now find any of them uncovered by rocks of subsequent date, and we should not, had it not been for those great atmospherical denudations which have stripped off miles in thickness of overlying rocks, so as to expose those of an older date. The Laurentian strata have had, perhaps, miles in thickness of the rocks of other formations piled above them. They have had to undergo those great depressions which eventually brought them so much under the influence of the earth's internal heat. Masses of granite, trap, porphyry, &c., have been intruded through them, and thus they have been squeezed and contorted in the most fantastic manner. The sandstones, some of them five hundred feet in thickness, have been so affected by heat as to become *quartz*, or quartzite. Here, then, you have the secret of my origin—the whole history of the changes which brought about my present appearance! The limestones that were contemporaneous with myself were altered so as to resemble loaf-sugar, and had all, or nearly all, their organic remains obliterated. The shales and slates became transformed by heat, chemical change, and pressure, into *mica-schists*, *gneiss*, *felstones*, &c. So that the very peculiarity in dip, contortion, absence of fossils, mineralogical changes, &c., which mark all the rocks of [the Laurentian age, tell of their vast antiquity; whilst the similarity in composition of these rocks in all parts of the world,—in Ireland, Scotland, and North America, as well as the prevalence of the same lowly-organized fossils in their limestones, indicates they have passed through the same transformations since they were contemporaneously deposited as limy muds, sands, and clays along the floors of the primeval seas!

LUMINOSITY OF PLANTS, AND RETINAL VARIABLE SENSIBILITY.

"AGAIN, I always find, and should be glad to know if *others* do, that if the eye is fixed upon a particular flower, the flashes are not seen, while they are very visible the moment the eye is, as it were, loosened, and allowed to wander over the flowers." Such is the Note-and-Query of "E. T. S." in the August number of SCIENCE-GOSSIP, speaking of a phenomenon "seen in the *dusk* when the fading light is somewhat confusing."

Whilst reading the above, I was at once reminded of a fact narrated by the late Sir John Herschel, in connection with the subject of sidereal astronomy. He states, "There is a group of stars called the Pleiades, in which six or seven may be noticed, if the eye be directed full upon it, and many more if *the eye* be turned carelessly aside while *the attention* is kept directed upon the group."

I think there is an analogy between the botanical and the astronomical occurrences. The explanation given by the illustrious astronomer is this: that "the centre of the visual area is by far less sensible to feeble impressions of light than the exterior portions of the retina. Few persons are aware of the extent to which this comparative insensibility

extends previous to trial. To appreciate it, let the reader look alternately full at a star of the fifth magnitude, and beside it; or choose two, equally bright, and about 3° or 4° apart, and look full at one of them; the probability is he will see *only the other*—such, at least, is my own case." And I can add, mine also. I have frequently put the statement of Sir John Herschel to the test in other ways. Thus, in looking for a boat or buoy in the water on a dark cloudy night, when the object is barely visible, I have often found it when I was not looking full at it, and have convinced myself that I had discovered the object, and proved this theory by looking carelessly aside a few degrees (more, generally, than Sir John Herschel gives), when it became quite evident

One notable and melancholy occasion I well remember. It was a December night on the Atlantic. The cry of "Man overboard!" had aroused me, and hastening on deck, I found the lifeboat already manned and in the water, quickly going astern, the patent life-buoy let go, and the engines stopped. Soon an excited group had assembled on the poop, and, curiosity satisfied, it soon became a silent, watching group, that heeded not the passing time as we rose and fell on the still, deep, gloomy ocean. Opera-glasses and telescopes scanned the dim horizon and the dark waters. "Do you see the boat yet?" "I think I see her." "How far off?" —and then the hail, "Have you found him?" and the dismal response, "No!"

I was not the first, or the second either, to see the returning boat, but when I did I was much surprised that I had not seen her sooner. I believe I was looking intently at her in the direction indicated by many who had better sight than mine, and that it was when my eyes were diverted from the object that it broke suddenly into view; when, according to Sir J. Herschel, its image was thrown on a portion of the retina more sensible to feeble impressions than the centre of the area of vision. I verified the fact by gazing at the boat as she rode over the waves, when I found that she appeared less plainly than when I was looking aside from her.

Now, all these cases are of a similar nature. And it must be distinctly remembered that the rule applies only to *feeble impressions* of light, or dusk, in the night, or again, as "E. T. S." remarks, "when the fading light is somewhat confusing."

In explanation of the subject, I must not forget to mention that Hueck states that, without altering the *direction* of the axis of his eyes or the quantity of light admitted, but merely by fixing his *attention* on a side object, he was able to widen his pupils as much as one-half more than their former diameter.

The application of this (if it be generally true, which I have failed to demonstrate very satisfactorily) to the point in question may be only a reduction to Sir John Herschel's theory.

Anatomists and physiologists have discovered that there is one spot on the retina which is absolutely insensible to light; and if the image of any object fall on this particular spot, the impression is not conveyed to the brain—we do not see the object. Any person may prove this in a very simple manner, by an experiment known, I believe, as "Mariotte's," and which is generally allowed to be a demonstration of the insensibility of that particular part of the retina where the *arteria centralis retinæ* enters it. The spot is not in the axis of vision, but internal to it—nearer the nose. The knowledge, therefore, of its existence is no help in replying to the Note-and-Query of "E. T. S.," but, in connection with the subject of retinal variable sensibility, it may be interesting. I have often amused my friends by the experiment, and, as it is also instructive, I will describe it.

Bring your thumbs together, touching by their inner margins, the fingers closed on the palms of the hands; maintaining them in this position, extend your arms horizontally from you, keep your arms and hands thus, steady, thumbs well upright, close the left eye; fix the right on the left thumb. You now see the backs of your thumbs with the right eye. Whilst keeping it fixed on the left thumb, move the right outwards from its fellow very slowly. Although the right eye is rigidly fixed on the left thumb, you perceive the right moving outwards, *until* it arrives at a certain point (about six inches from the left), when you lose sight of it. Move it still farther outwards, or upwards, or downwards, and it comes into view; but there is one position or place in which it disappears altogether, because its image then falls on a part of the retina which is insensible to light. The same experiment may, of course, be performed with the other eye.

Barbadoes. J. P. M. Boileau, M.B.

NOTES ON THE FAUNA OF BRITTANY.

Pieris daplidice (the Bath-white) was moderately plentiful along the coast. I took the two first I saw with my hat, as they are weak flyers. The best spots for them were patches of a yellow-flowered plant of the Cabbage order. The same plant, I think, grows plentifully on our town-walls round Southampton. I only met with one female Bath-white.

Colias Hyale and *Edusa* (the pale and dark clouded yellows) were very plentiful in the lucern fields. *Hyale* was rather the commoner of the two.

Argynnis Dia (the Gorless fritillary) frequented the small patches of heathery ground along the coast, and with it were quantities of all our common August butterflies. *Argynnis Dia* is a reputed British species.

Among the moths I took a handsome and marked

species of "tiger-moth," which flies like our "cream-spotted tiger" (*Arctia villica*). In the daytime it approaches most in appearance our scarlet tiger, *Callimorpha dominula;* also a pretty *Littrosia*, or footman-moth, not met with in England; and *Acontia albicollis*, one of the Noctuas, which Edward Newman gives as doubtfully British. The last was hovering over some flowers about noon.

Formica rufa, the Wood Ant, abounded all over the country I examined. I saw nests in the sand-hills, amongst rocks, and aloug the hedges of cultivated fields. The colonies were small, however, and nests much less than those at Weybridge, in Surrey. Where a sandy locality had been chosen, little paths were worn down in the saudy turf.

Formica sanguinaria, the Sanguinary Ant, which is not British, I think, was less common thau *F. rufa*. One colony I found were marching in a column a few yards long, with small pupæ of apparently another species in their jaws, which they took down into their uest. It had little or none of the external coping used by *F. rufa*. These ants are the species that make slaves, and so I concluded this was a raid for procuring them.

The other most conspicuous iusect was a large grasshopper, with blue hind wings, very pretty when it flew for a few yards.

Of the land snails I found *Helix virgata* (Da Costa) in great abundance, and very much finer than any English ones, beiug uearly equal in bulk to our *Helix nemoralis*. The greatest diameter of a shell by me is 9-10ths of an inch! These large ones frequented the sand-hills. A pure white variety, and some others of smaller size, abounded.

Helix pisana (Mull) I got on a rocky slope of the river Rance. The shells are larger aud much less strongly banded and coloured thau my English shells. One measures 19-20ths of an inch in diameter.

Bulimus acutus was to be had everywhere, and of large size also. Although I did not get many varieties, those taken at Dol, a few miles up the country, were not so fine as some I fouud on the seashore.

Birds were scarce. I saw a good mauy "wheat-ears" and one kestrel hawk.

Every cranuy of the rocks above high water was inhabited by lizards, of what species I cannot tell for certain.

Lastly, I found in a crevice opening to the north, close to the sea, some *Asplenium marinum*. From the position in which the fern was growing it was evident that the sun never reached the spot all the year round.

HARRY LESLIE.

Southampton.

OF all birds to whom is given dominion over the air, the lark alone lets loose the power that is in his wings only for the expression of love and gratitude.—*Christopher North.*

ANTS.

THE conclusion of my former colony of ants is briefly told.* Towards the beginniug of October all the neuters disappeared below ground, and for full four months were almost totally invisible. Occasionally, on a sunny day, or if the room was warmer than usual, perhaps a single specimen might be seen slowly and languidly crawling along the surface of the formicary; but in a very short time it would once more retire below. I sometimes, as with my first colony, placed a candle near the glass sides, but it failed to attract any of the inhabitauts.

I fouud that all the females did not leave the formicary at the time of swarming, which took place on September 25th; because, two or three weeks after, I regularly, for three or four days, found one or two drowned aud wingless females lying iu the tank. I conjecture that these six or seven stayed, or were kept, behind, to lay their eggs, and afterwards departed to die.

At the beginning of February I repaired the formicary, and put a stratum of moist earth ou the surface. These alterations to some exteut roused up the inmates, aud a few emerged from their winter recesses, and began sleepily to commence a few excavations. But they showed none of the ordinary signs of life and activity, and appeared in very scanty numbers, until at the end of May, supposing that the colony must have exhausted itself, I resolved to break it up. I removed the glass sides of the formicary, and then cut the block of earth into four quarters. I only found about twenty or thirty ants, no cocoons, and I could uot discover any eggs. The entire mass of earth was extensively burrowed, but it did not contain chambers of any large size; the nearest approach to which cousisted in an increase in the width of the passage.

Just about this time I put one of the neuters on to a piece of thread stretched tight. The most ludicrous sight ensued. It hung for a while back downwards, and attempted to move along the thread by clasping tight with one leg and drawing itself along by the others. But it soon found that it did not get far by this means, and it tried to get on to the uppermost side of the thread. But when it had with great difficulty raised itself up, it would invariably go a little too far, and, overbalancing, would fall completely head over heels into its old positiou. This occurred again and again, until I returned it to the formicary.

My second colony I started on May 20th, 1871. I find that slips of stroug paper, fastened with very stiff gum to both the inside and outside of the case, are quite sufficient to connect the glass sides, if

* See SCIENCE-GOSSIP for 1870, page 241.

they are also sunk at the bottom into a deep and puttied groove. I think that for the back and front the most convenient size is a foot square, but the sides are best not so broad. Of course, the larger the case the better it will be, and its dimensions must much depend on the amount of space and materials at the owner's disposal. The size I mention is that of my present case, and will hold with comfort a very large nest indeed. This time I had the trough made of zinc; my objection to which, taught by bitter experience, will be seen further on. This formicary was all made by myself, with the exception of the zinc trough; and the whole apparatus cost me altogether three shillings.

In order to prevent any possible mistake, I sent a specimen of the ant to Mr. Frederick Smith, of the British Museum, to identify, who told me that it was *Myrmica ruginodis*, of Nylander. He further informed me that Linnæus certainly included three or four species under that name; and that English entomologists having failed to distinguish between *M. ruginodis*, *M. scabrinodis*, and *M. lævinodis*, all these were referred to *M. rubra*, Linn.; but that it being impossible to determine what *M. rubra* of Linnæus was, all the three allied species being found in Sweden, *M. rubra*, as a specific name, cannot be retained. Mr. Smith also kindly gave me the following most valuable information, in which he pointed out one or two specific differences by which I might distinguish between these three



Fig. 143. Antenna of *Myrmica ruginodis*.

allied species of *Myrmica*. The female and worker of *M. scabrinodis* may be known by the fact that the scape, or first joint of the antenna, is bent or elbowed; whereas, in my own species, *M. ruginodis*, the scape tapers to the base without an elbow (fig. 143). The only difficulty to contend with is in comparing *M. lævinodis* with *M. ruginodis*, because the antennæ do not differ in form. The two peculiar spines, however, on the metathorax (fig. 144), are somewhat shorter in *M. lævinodis*, and the two nodes of the abdomen are also much smoother. The males may be known as follows:—In *M. scabrinodis* the scape of the antenna is very short, in *M. ruginodis* it is long, and in *M. lævinodis* it is intermediate. Thus, with a little careful observation, one may determine with certainty the precise species.



Fig. 144. Spines of Metathorax of *Myrmica ruginodis*.

I collected a very large number of *M. ruginodis* without much difficulty, and placed them in the formicary; and I also secured a considerable quantity of larvæ, which were in the form of small white and annulated maggots. These ants even surpassed *F. nigra* in the blind impetuosity with which they endeavoured to make their escape, and they fell with such rapidity, one after the other into the moat, that for an hour or so I and one or two others were fully employed in saving them from death by drowning. After a time they settled down; but it was two or three days before they began any extensive excavations. But when once they set to work, their energy and zeal was astounding, and they infinitely surpassed *F. nigra* in this particular. When in the height of their work the burrows increased almost as if by magic. They were of very considerable width, and the external openings were unusually large. All the sides of the formicary were pretty evenly burrowed, with the exception of one. Why this portion should have been so much neglected, I do not know; for, although not the lightest, it was not by any means the darkest side.

The appetite of this species of ant is most voracious, and they will devour food with astonishing rapidity. I have given them as many as ten or twelve large blue-bottle flies in one day, all of which disappeared down below soon after I had deposited them in the formicary, with the addition of the soaked lump sugar. This is what I chiefly fed them upon. But *M. ruginodis* is eminently a carnivorous insect, and the sugar they only cared for as a variety to their usual diet. They scarce ever ate anything above ground which could by any possibility be taken below; and if I gave them a fly, or any such-like insect, they would straightway convey it down the nearest burrow. This operation would often take the entire day, until they had

widened them all; for they struggled to get their prey out of sight without any regard to the width of the tunnel, and, in consequence, would waste much time in enlarging it to the necessary dimensions. I once had made a large cavity in the surface of the formicary by pressing my finger into the mould, into which I dropped a fly. The ants, of course, took it beneath then and there; but, thinking the opening too large, they moderated its size by partly filling it in with neatly arranged lumps of earth. I observed that if I had provided them with some large article of food, such as a sparrow, that they would so satiate and gorge themselves, that afterwards, for a week or more, they would leave the most tempting morsel almost untouched. *F. nigra* was a very thirsty race, but I rarely or ever saw *M. ruginodis* make any attempt to drink. I used to think that the ants informed each other when a fresh piece of food was given to them, but I now believe that it is their strong sense of smell which attracts them to their prey with such rapidity and in such numbers. It is also a most peculiar fact that I never saw two of my ants communicate by touching antennæ, as *Formica nigra* so constantly did, and I could not detect any other means of communication.

I have noticed amongst all kinds of ants that the waste of labour is great. I have seen seven or eight ants tugging at a fly with might and main, all in different directions, which would remain, in consequence, almost motionless. At other times one ant alone can drag a great fly with ease half across the formicary. On the 1st of June I saw a wonderful revolution amongst some of the colony. One of the ants had fast hold of a comrade by an antenna, the part they always in their battles try to seize, and was struggling hard to drag it along the ground. The other was strenuously resisting this violent treatment, until a third ant happened to come upon the scene, and apparently taking the part of the hapless victim, he seized it by a leg and tried vigorously to pull it away from its aggressor. The latter was, for all this, gaining the day, when the others chanced to come into contact with a clod of earth, to which they clung with all their strength. In spite of this the aggressor managed to haul the other two, clod and all, to some distance, until they both lost hold of the clod, and the rescuer let go his grasp of the victim, who now began to fare badly. This created terrible excitement amongst the neighbouring ants, and they ran round about and even over the combatants, but offered no further assistance, until at length an ant ran hurriedly up, stroked number one rapidly with its antenna, who at once released his prisoner, and they all went quietly off. I have frequently noticed the instantaneous manner in which they will leave off fighting, and then apparently forget all their grievances. They did nothing but quarrel; and, though it seems a wild theory, I often could not help thinking that summary justice was inflicted upon offenders by certain ants set in authority over the others.

In August, in the very hot weather, a number of wasps, which have been so plentiful this year, were attracted into the room where my formicary was stationed, through the open windows, to feast on the lumps of sugar. It was then that the truly plucky nature of *M. ruginodis* appeared. Their indignation at the intrusion was immense, and they valiantly attempted to drive off the marauders. The wasps were divided betwixt greediness for the sugar and fear of the ants, and sometimes, in the attempt to get rid of them, seized them in their jaws, and with a jerk literally tossed them to some considerable distance. Every now and then an ant would get a firm hold in a place where the wasp could not reach it with its jaws, upon which the latter would roll over and over, buzzing and striking with its feet, in vain endeavours to dislodge its painful parasite; and sometimes they would be attacked in such large numbers that they would have to fairly fly away for a time and settle afresh. Their tossing away the ants had no effect in quelling them, for the moment they regained their feet they rushed forwards again to renew the attack, only to be once more hurled to a distance.

I subjected an ant to microscopic examination in search of its sting, and on pressing the abdomen I saw a long and formidable curved lancet protrude. It much resembled that of a wasp in miniature, and the tube through which the acid is conveyed through the sting and into the wound was very distinct. They can only pierce an opponent when they double up their abdomen under the thorax; and for this reason, that the sting has a peculiar upward curve, which makes this particular movement necessary before it can be brought into a stinging position. If they are kept straight, they can only nip lightly with their jaws, which gives but little pain. They are reluctant to sting unless forced, and I tried a long while before I could get one to attack me. At length I got one to do so, who stung away lustily for a short time. The place was afterwards most horribly painful, swelled much, and was hard and red for several days. In my last article on ants I remarked that *Formica rufa* had a veritable and a very painful sting. In this I was incorrect. None of the *Formicidæ* are provided with that appendage.

For the first week after the establishment of the formicary, the platform was literally strewn with dead ants. Whether they were ants who had been injured in the removal, or whether they were those who had died from the change of circumstances, I do not know. From that time to this I hardly remember the death of a single ant, or, to say the least, none were visible. They were not as careful

as *F. nigra*, in clearing away rubbish, for although, as far as I know, they always carried their dead down to the platform, none of them were thrown into the water, and the remains of flies and such-like they generally left lying up above in the formicary. Their curiosity, like that of all ants I have come across, was inordinate, and whenever I cleaned out the trough or the platform, hosts of ants, apparently the whole colony, would pour down one after the other to witness the change.

M. ruginodis were very persevering in bringing their young into the warmth of the sun, and left them out very much longer than *F. nigra* did. In fine weather they would often remain in the passages next the glass from eight in the morning until five or six in the evening. The pupæ are never enclosed in cocoons, and when placed out in the warmth they were curled up, and of a white or brownish colour. I saw none in my nest after August 12, but in colonies out of doors I noticed them several weeks later. On June 22 I gave them two larvæ from a strange nest of *M. ruginodis*. They were instantly detected as intruders, and the first ant who came into contact with them, instead of carrying them into shelter with all speed, as he would by his natural instincts have done, began to tear and pull them about in the most unmerciful manner, and though after a time the ants conveyed them below, it was palpably to eat and not to nurture them.

Night was always a quiet time with *M. ruginodis*, although at all hours there were generally one or two about. Their principal opening was also in the centre, by the roots of the grass, and males and females when they attempted to emerge, as they often did, were peremptorily and even savagely repulsed. They swarmed on August 30, nearly a month before *F. nigra*, but I was not present at the time, and, most unfortunately, was not informed of the occurrence till afterwards.

The end of my formicary was not successful. I noticed, on August 18, that the colony was in a state of great bustle and excitement, and the whole surface of the formicary, the glass sides, the burrows, and the platform were swarming with ants hurrying hither and thither. As I subsequently found, they were on the point of migrating, for in the course of that fatal morning they escaped by the dozen. Nothing stopped them; they fearlessly crossed the water, although many were drowned in the attempt, and many had a long and desperate struggle before they reached the opposite bank. If put back into the case, they instantly set about a fresh escape, and I soon found that all my efforts were perfectly vain, and that I must let them go their own way. And so I did, and by the evening all the principal portion of my colony had decamped. They made direct for a crack under the window, down which they went, and thence, doubtless, they got into the garden. I feel sure that nothing would have kept them in; but their escape was facilitated by my trough being made of zinc, which caused a generation of gases on the surface of the water, on the top of which they could easily and lightly cross. The zinc was continually a source of trouble to me in this way, and there was also a constant settlement of thick gummy mucus at the bottom of the water, which makes even the rust of tin far preferable to this. I fancy that sheet lead would prove as obnoxious as zinc.

Since this migration the few remaining ants have done little or nothing. They neither eat, drink, or work, and I shall, next year, have to entirely re-stock the formicary, probably extending my observations to a fresh species. At the time I write, however, October 3, what ants are left have laid themselves up for the winter. I must also observe that I was away from home all July, and, in consequence, I doubtless lost many observations which I otherwise might have made.

Ants have been endowed from time immemorial, by both ancient and modern writers, with divers magic and marvellous qualities. The following receipt of the famous old herbalist, Culpepper, is a good and amusing instance of this:—

"To draw a tooth without pain.—Fill an earthen crucible full of emmets, ants, or pismires, eggs and all, and when you have burned them, keep the ashes, with which if you touch a tooth it will fall out."

EDWARD FENTONE ELWIN.

Booton, Norwich.

DEFENSIVE RESOURCES OF BRITISH INSECTS.

ON reading the article entitled "Protective Mimicry," in the September number of SCIENCE-GOSSIP, it occurred to me that a more extended view of the display of this power among our British insects might possibly be interesting to unscientific gossipers, and, better still, might provoke in the pages of that periodical a little harmless discussion on the subject. Much, *very* much, is still to be gleaned respecting the habits of insects, and there are whisperings abroad that we English entomologists are getting strangely lazy, for in an early number of the *Field* for 1871, the reviewer, while picking out the flaws in a French work on insects, took occasion to deplore the—what shall I say—fact—that England was doing very, very little to advance the cause of entomology. The plaintive reviewer had, I am sorry to say, a good deal of truth on his side, for nowadays the majority of us, I fear, instead of watching the habits of an insect, either impale it on pins to swell a collection, or else amputate one of its members with an ingenious flourish and dexterous cut, macerate the said

member in—the dickens knows what,—mount it in Canada balsam or castor oil, and then bring a popular microscope to bear upon it, the view then presented being "magnificent," "wonderful," "perfect," "altogether indescribable," mixed up with a profusion of "dear me's" and "good graciouses," from the feminine operators. I do not wish to be thought a contemner of the microscope, far from it; on the contrary, I appreciate its usefulness, and look upon it as one of the few and pure sources of profit and pleasure combined; but is it not humiliating to see so many translations of French works on insects issuing from the press, while England, practically speaking, is too much engaged with her microscope-mania to pay much attention to the wonders of transformation or any similar subject? However, let us hope for better times; let us hope that many worthy English Reaumurs, Lewenhoecks, and De Geers will shortly appear on the entomological horizon, and thus wipe off the stain which the *Field* reviewer has so unhesitatingly bestowed on our character.

In the article previously referred to, the writer gives an amusing recital of the deportment of a very harmless moth, which, in addition to bearing a great resemblance to the ferocious hornet, was likewise gifted with the power of mimicking the actions of that insect, and by various significant hints to show that it was capable of making as vigorous a defence as *crabro* himself. I wonder whether other entomologists have noted this habit of the Lunar Hornet Sphinx—the popular English name of the moth in question,—and whether the other species of clear-wings, resembling flies, bees, &c., have ever been observed to display the same power of mimicry? It is certainly a very singular faculty, and the writer has well styled it "protective mimicry." In the present article on the defensive resources of insects the power they possess in active mimicry will be waived, and mention only made of that passive counterfeit of death and insensible mimicry of inanimate objects, which in many cases is their only means of defence. Insects have so many enemies that if some means of defence had not been provided them they would doubtless have soon disappeared from the earth. I say this advisedly, notwithstanding the extraordinary fecundity of insects. A perpetual war is being waged upon them. Thousands, nay millions, of animals derive their entire subsistence from the insect world, and as the numbers of the finny tribe are affirmed to be diminishing, so, perhaps, a hundred years hence the same may be said of insects. Next to the great fecundity of insects the reluctance with which many of them part with life may be brought forward as another reason why their numbers are so immense. I have seen a moth (*Spilosoma menthastri*), when deprived of head, thorax, legs, and wings, so that nothing but the abdomen remained, continue to extrude its eggs for a long time, and not till this act for the perpetuation of its species had been completed did the convulsions of the dismembered body cease. If cats have nine lives, surely beetles have ninety-nine. Cockchafers, dor-beetles, and wasps may sometimes be seen alive though destitute of viscera, and moths and flies headless but still lively are very common occurrences.

Kirby and Spence, the eminent entomologists, have placed the defensive powers of insects under two heads, viz., *active* and *passive*. The first of these consists of the employment by the insect of weapons or other active means of defence, and the second by insensible means of resistance, independent of the will or effort of the insect. Familiar examples of the first are the poison-laden stings of the hornet, the wasp, and the bee. These insects, and those allied to or similar to them in structure, are the best fitted for the successful resistance of enemies, and to these effective means of defence is owing their plenitude. Were the honey-bee destitute of a sting, the presence of the straw hive in cottage gardens would, I venture to say, be a less common occurrence than it is at present. The Rev. J. G. Wood says that the swallow—a most persevering collector of insects—devours only the stingless bees, and allows the better-provided ones to escape. Truly the swallow must be a discriminating bird, and an entomologist of no mean order, if it is able in its aërial flights to distinguish the drone from the working bee. But probably that wonderful power *instinct*, which, though denied to mankind, is present in birds and beasts, might have been given to the swallow in a super-abundant degree. This hackneyed term "instinct" has always to stand sponsor to statements in natural history which bear a resemblance to that *reason* on which we pride ourselves as being the only possessors.

> Instinct to reason sure is near allied,
> And thin partitions do their bounds divide.

The dragon-flies and many of the British beetles have active means of defence. The heads of the former are often terribly armed, and their bites very severe. Their disposition is also cruel and rapacious, and they have even been known to devour their own tails. Some of the species are likewise cannibals. I have caught that lovely species the Demoiselle with a piece of another in its mouth. This beautiful fly is common by the sides of streams in May and June. The male has a rich blue body and a deep purple spot on each wing; the female has a bronzed-green body and is spotted on the wings. The grasshoppers, especially the giant species *viridissimus*, are gifted with great powers of biting, and will readily seize a finger when presented to them; so also will any of the ants. The bites of the red and the wood ants are often followed by painful blisters. The common gnat does not (I believe) use its collection of surgical instruments as

weapons of defence, but only, I grieve to say, of offence. The attack of this little midnight prowler on a delicate subject is often plainly visible for days, and many sensitive persons, after an introduction to one of these beautifully-formed but desperate blood-suckers, feel somewhat shy of venturing into public life till the red splotches, so sadly suggestive of indulgence in "drops," have disappeared from the cheeks and forehead. The caterpillar of the Puss Moth (*Cerura vinula*) carries at the end of its body two black sheaths or tails, each inclosing a pinkish tentacle or thread, which, when the creature is irritated, it thrusts out in a very menacing manner. This apparatus is said to be used as a whip to drive away the ichneumon flies, which prey in their larval state on caterpillars; but this we beg leave to doubt, and also the assertion that the tentacle will give an electrical shock when touched with the hand. This caterpillar is common on willow and poplar trees in autumn.

The beetles have various means of active defence. There is the *Bombardier*, a species provided with a kind of artillery with which to keep at bay its insect enemies. The bombardier, on being alarmed, turns its hinder part to the enemy and lets fly a charge of blank cartridge, having all the essentials of real artillery, viz., a noise, accompanied with smoke, and a peculiar smell. If one discharge does not stop the progress of the enemy, the bombardier again turns its artillery upon it, and bangs away with the perseverance of Wellington's Spaniards. It has been known to fire twenty times in succession. The explosive substance is a fluid contained within the body, which, on being ejected, becomes volatilized by contact with the atmosphere.

A mode of defence almost unique among British insects is that of the Death's-head Hawk-moth (*Acherontia atropos*) and its caterpillar, both of which emit a shrill squeak when alarmed; and this, it is said, is sufficient to scare even the plundered bees when the moth, too lazy to obtain honey in the usual way, creeps into the rich hives for that purpose.

Another method of active defence in insects is the emission of certain fluids, accompanied in some cases by a fetid smell, in others by a mimicry of death. The whole family of *Coccinellidæ*, or Ladybirds, on being alarmed, fold up their legs and counterfeit death, at the same time emitting from the joints of the limbs a mucilaginous, disagreeably-smelling, yellow fluid. The power of counterfeiting death is not peculiar to the ladybird, but is shared by several other insects, and in many cases is their only means of defence. Birds, as a rule, are averse to picking up dead game, and consequently many of the insects which possess the power of feigning death escape destruction by this means. Other examples of insects emitting fluids are the two Bloody-nose Beetles (*Timarchia tenebricosa* and *coriaria*), which, on being handled or alarmed, exude from the head a bright ruby-coloured fluid; and this they will repeat several times in succession. This fluid does not smell or taste particularly strong, and when applied to the skin only stains it slightly. It has been affirmed, however, that when the insect has been compelled by pressure to eject the fluid with violence against the cheek, or other delicate part, the result has been a smart pain. Another eccentric individual is that curious insect the Oil Beetle (*Proscarabæus vulgaris*), which is so often seen in April on the grass by the sides of hedges. If you take it up, it will fold its legs and emit from the joints a clear yellow oil, not an ordinary insect fluid, but possessing all the essentials of an oil. Some caterpillars likewise exude a fluid from the mouth (generally of a green colour), among which may be mentioned those of the large Cabbage White and Peacock butterflies (*Pieris brassicæ*, *Vanessa Io.*). The caterpillar of the Puss Moth, previously mentioned, has the power of ejecting a fluid, which, though harmless to its human foes, is probably very obnoxious to its insect enemies. This fluid it ejects from an aperture under the head. The Wood Ant (*Formica Herculanea*), in addition to its powers of biting, can also dart a venomous fluid which will raise a blister on the skin.

In place of the ejection of fluids as a means of defence, some insects, and especially beetles, have the power, when in danger, to throw out such a quintessence of stenches as to taint the surrounding atmosphere. I once drew a handkerchief across one of these insect-skunks, and in an instant every part of the cambric was affected with the disgusting odour. The majority of Londoners need not be reminded of the defensive powers of that metropolitan household pest, the Bug. Then, again, some insects have the power of diffusing odour pleasant to us, but probably offensive to certain foes. The Musk Beetle (*Cerambyx moschatus*), found in summer about old willow-trees, gives out a smell of roses, and the Tiger Beetle (*Cicindela compestris*), common in May and June, on sunny banks and highways has a pleasant smell not unlike the leaf of the verbena.

There is a method of active defence among insects which consists of a single effort and a passive awaiting of the result. Thus, many of the hairy caterpillars on being alarmed curl up into a ring and fall to the ground, leaving the stiff spines to project on every side as a defence from attack on the more vital parts. The almost impenetrable coat of the hairy caterpillar is a capital means of defence, and is no doubt the reason why so few of these insects fall victims to ichneumon punctures.

The most common mode of active defence in insects, and the last we will mention, is that of quick motion, which is shared by the majority of insects. Properly speaking, however, quick motion is not a

defensive power, yet, being a method to which many insects owe their immunity from destruction, we mention it. The zigzag flight of the butterflies and moths, and the hopping powers of the flea, are good examples of quick and eccentric motion. The Ghost Moth (*Hepialus humuli*) is gifted with an almost magical flight. This moth may be seen in summer evenings flying a short distance above the tall herbage in meadows and fields. Suddenly, when watching its white flutter, it vanishes as totally and with as much celerity as its namesake is popularly supposed to do. The real explanation of this curious proceeding is that the insect has suddenly settled on a stalk, and has hid from view its white upper wings, turning to the spectator the dark hinder ones only. The little gilded hopping beetles, &c., on willow, hazel, and elm leaves, are other good examples of quick motion; to which we may also add the leaping powers of the various grasshoppers, and the air-jumps of the Skipjack Beetles and the Scarlet and other Hoppers.

Let us now run over a few of the *passive* defensive resources of insects. One of the most interesting modes of passive defence in insects is the resemblance many of them bear to other carefully avoided insects, or to inanimate objects. Several of the clearwing moths (*Sesidæ*) are remarkable as examples of the first-named peculiarity. One of these, the Hornet Moth (*Sesia apiformis*), is so similar to its namesake, the ferocious *crabro*, that it is continually liable to be mistaken for such by those not conversant with the lepidoptera. The Currant Clearwing (*Sesia tipuliformis*) is quite as likely to be mistaken for a gnat or a fly. There are other species resembling ants (winged) and bees. The great Saw-fly (*Sirex gigas*), despite its hornet-like appearance and the formidable ovipositor at the end of the body, is yet a very harmless insect, and the Humble Bee Fly (*Bombylius medius*) does not carry out its resemblance to that insect so far as to possess a sting; neither are the Bee Hawk-moths (*Macroglossa bombyliformis* and *fuciformis*) so bee-like as they appear. None but the initiated would take the Humming-bird Hawk-moth (*Macroglossa stellatarum*) to be a moth at all. The Rev. J. G. Wood, in his "Common Moths of England," says (when noting the resemblance of this moth to the humming-bird) "that persons who have resided in the West Indies, and afterwards come to live in England, have been deluded into the idea that they have seen genuine humming-birds flying about." Indeed the mode of flight, manner of feeding, and general appearance of this insect is very similar to that of the humming-bird. The bird, like the moth, hovers over the flower, and with its slender bill, similar to the *haustellum* or sucker of the moth, extracts its food. The the tail of the bird is well represented in the moth by a feathery process at the end of the body, and the wings hum and vibrate like those of the tiny bird. The Stone Plume (*Pterophorus lithodactylus*) is about as much unlike a moth as the clearwings are, and is no doubt frequently mistaken for a small edition of a "daddy long-legs," or crane-fly.

Better even than the resemblance to other insects is the power many species *passively* possess of counterfeiting inanimate objects. The best examples we can find of insects displaying this power are the Looper caterpillar, many of which have the art of stretching out and stiffening their bodies into the form of shoots and twigs, and as their colours generally harmonize with the leaves and branches, the deception is often so complete that persons have unwittingly gathered caterpillars instead of twigs from sheer inability to distinguish one from the other. In some cases, to still further keep up the resemblance, the caterpillars bear on their bodies crooks, humps, and even thorns. Several of the moths, when "at rest," much resemble surrounding objects. Thus, the Lappet Moth (*Bombyx quercifolia*), when settled on the branch or trunk of a tree, looks like several small leaves collected in a bunch which had fallen there by chance. Again, the Lime Hawk-moth (*Smerinthus tiliæ*), in its peculiar hanging position and general shape, bears no distant resemblance to some prematurely faded leaf; while the Sycamore Moth (*Acronycla aceris*) is quite as likely to be passed by as merely a bunch of grey lichens.

The safety of most caterpillars lies in their colour closely harmonizing with those of the trees and plants on which they feed. It is very interesting to notice the extra care taken by nature to provide for the safety of the insect in its larval state—indeed, more ways of defence are vouchsafed to the caterpillar than to the perfect insect. The leaf-roller lies snug in its leafy tube, and if that is assailed, often escapes through its adroitness as a rope-spinner; the Caddis-worm dons its coat of mail and defies the attacks of aquatic foes; the Ant-lion larva conceals itself at the bottom of its burrow; the Gall-fly larva feeds away its grubhood in the snug oak-apple; the Cuckoo-spit larva wallows in froth; while many caterpillars of the moths spin silken webs of considerable thickness, through which even the birds can scarcely make an entrance, and by the time the walls are carried the inmates have all filed out through convenient apertures, and have sought the thickest part of the bush. The fragile-looking Lacewing flies place their eggs at the ends of slender tubes or stalks, which effectually preserves them from being devoured by predaceous insects. To return. Many of the insects which live in sand and earth have exactly the same tints as their surroundings. The prevailing colour in caterpillars is green, and as the greater number of them feed on the leaves of trees and plants, this similarity in colour is of essential service in concealing them from their enemies.

The parched and withered appearance of the grass at the end of summer assimilates so closely with the hue of the grasshopper, &c., found at that time, that were it not for their activity and heedless leaps they would be scarcely discoverable. The little blue butterfly (*Polyommatus Alexis*) perched on the flower-head of the scabious or the corn bluebottle, is another familiar example of the protecting influence of similarity of colour. The moths, as I have already pointed out, will likewise afford the entomologist several examples of this thoughtful provision of nature. Sometimes, however, the same power of ready concealment is given to the enemies of insects, which are thus enabled to seize their prey with greater facility. For instance, last August I noticed a beautiful glossy-green fly buzzing loudly in a bramble blossom, and trying hard to extricate itself. I thought, of course, that it had been caught by the blossom, and that I had discovered the latter to be a genuine fly-trap. On gathering the blossom, and pulling at the fly, I found that a spider of exactly the same colour as the centre of the blossom had nailed the fly fast by its proboscis, and all its struggles to escape were fruitless. I released it, but it was nearly dead.

Several of the hairy caterpillars are no doubt instinctively shunned by birds from the power they passively possess of annoying, even in death, their ornithological devourers. I allude to the urticating properties of the spines in some species, the effect of the punctures of which on the human skin is no doubt familiar to every entomologist. Rennie declares that no bird will eat the caterpillar of the common Magpie Moth (*Abraxas grossulariata*); but why he made this statement of a larva quite *smooth* I am at a loss to understand.

Lastly, it is possible that the ferocious appearance, yet withal peaceful disposition, of some insects is their sure protection. Look, for instance, at the gigantic Stag Beetle, with its terrible jaws, and you would think it perfectly able to cope with anything; but these dreadful frontal arrangements are only useful in a passive sense, viz., they serve to menace and terrify by their appearance, and that is all. As weapons of defence in an active sense they are, we believe, seldom or never used. The Cocktail Beetles (*Staphylinidæ*) and the Earwigs, carry formidable forceps or pincers at the tail, apparently for active defence, but in reality they are simply used for tucking away the gauzy wings under the short elytra. The most consequential and impudent-looking of our British caterpillars is that of the Puss Moth, whose attitude when at rest is so well known. The caterpillar of the Elephant Hawk-moth (*Chærocampa Elpenor*) is far from prepossessing in appearance, the large ocellar spots on the skin on each side of the body looking like a couple of great staring eyes. The spines, spikes, and horns of many caterpillars likewise give them a very ferocious appearance, and probably insure them protection from injury.

This, I confess, is but a slight review of the defensive resources of insects; I therefore venture to hope that some of the entomological readers of SCIENCE-GOSSIP will send their experiences on this interesting subject, and thus make the list more complete.

WILLIAM HENRY WARNER.
Kingston, Abingdon.

SKELETON LEAVES.

THE title is not very taking, certainly. It does not hold forth a promise of much interest, yet if my readers, taking it for granted I am fortunate enough to have any, could but see the exquisite collection of skeleton leaves now grouped before me (and which I owe to the kind courtesy of a correspondent of SCIENCE-GOSSIP resident at Leicester), they would, I am sure, quite understand why I have selected such a subject.

The process by which leaves are skeletonized—or perhaps I should write, *a* process, for I am not aware by what means the donor of the present collection arrived at such perfection in the art—I will describe at the end of my paper; and meanwhile, before I notice the different skeleton leaves in particular, just glance at the action or uses of leaves in general, while they are on the tree. "Roots make leaves, and leaves make roots," is an accepted saying; but then comes the explanation, that the above wise-saw is good and true as far as it goes, but it does not embody the whole fact, roots being made without leaves, and leaves without roots.

This appears at first a puzzle, nevertheless it is true; but at the same time let me observe that neither can live long without the other, save in the case of plants which are not leaf-producing.

The action of the root spriglet (the end of the root) is much like the pulse in a human being, for it never stops, night or day, in heat or cold, until all vitality is at an end. Take a healthy tree as our example, and we find that directly the roots, stems, and branches are full of sap, the leaves burst forth; they are the lungs, and digestive arrangement also, of the tree. They give out the watery portion of the sap, by means of pores on the upper surface, and then, when it is properly purified and rendered sufficiently dense, they send it back to the root by a set of vessels on the lower or under side. This accounts for the very great number of *veins* which we find in a skeleton leaf; and thus it is that leaves, when skeletonized, present so lovely and delicate an appearance.

I have now before me the exquisite leaves of the *Chrysophyllum angustifolium* and *Ficus religiosa*. The former comes from the West Indies, where the

fruit of some members of the genus is eaten by the name of "Star-apple." The other, from the East, is the leaf of a species of fig; but you must not imagine that our native plants do not produce leaves fully as beautiful, when skeletonized, as their foreign cousins.

The Hedera (our Ivy), the Lady Fern, the Maidenhair, all full of beauty; but the gem of gems in the group I have is a fern from the Oregan Mountains. Another fern, from South America, is likewise very lovely, and such peculiarly delicate fronds must have required especial care in preparing.

I also received from the same source a card of dried flowers, the *colours* of which are so well preserved that they resemble a bright painting. I saw some specimens of this kind of ornamental work at a fête one day, given in the Royal Horticultural Gardens; but really they were not, in my opinion, so well done as the pretty little group sent to me from Leicester.

The usual way of skeletonizing leaves is to place the more delicate, such as fern fronds, in a bleaching solution, without first steeping them in water; but all the natural green tint must have faded away first.

The solution is made of chloride of lime,—two ounces dissolved in a pint of water. After the leaves have been thoroughly dried, they should be washed, dried, and carefully put away in a box, so as to exclude them from the air and light until quite fit for mounting.

I believe that the maceration of the larger strong leaves, such as the oak, chestnut, and others, is the most difficult part of the process: perhaps "H. G.," Leicester, will kindly give the readers of SCIENCE-GOSSIP a few hints on this point.

HELEN E. WATNEY.

Bryn-hy-Fryd, Beaumaris, North Wales.

ALONG SHORE.

STROLLING along the beach at Hastings, I picked up three or four common objects which had been washed up by the tide; but common as they were, there are some, perhaps, who have picked them up, as I have done, and wish to know what they are, and something about them, being at a loss to comprehend them.

The first object was an oyster-shell, perforated on the outside with scores of round holes, as if they had been bored by some enemy to its old inhabitant. Glancing more closely, by the aid of a pocket lens, it was easy to trace some yellowish substance coating these orifices, and, when the shell was broken, running between the calcareous layers of the shell. Surely it was a sponge,—the boring sponge so lately the subject of discussion at the Quckett Microscopical Club.

Was the sponge capable of boring these holes into the substance of the hard shell, or did it occupy and surround the holes which were already perforated by some other animal? This was the point in dispute. As for my own opinion, I feel convinced that, some how or other, but how I cannot say, the sponge *does* bore its way into the shell.



Fig. 145. Portion of Oyster-shell perforated by *Clione*.



Fig. 146. Section of Oyster-shell perforated by *Clione*.

But this vexed question it is not my intention to revive. There was the sponge, and by boiling in nitric acid it was easy to isolate the pin-shaped

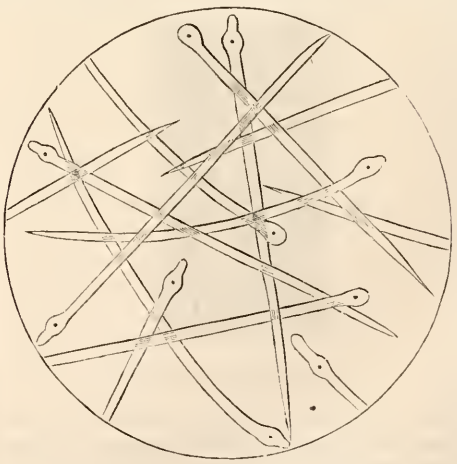


Fig. 147. Spicules of sponge (*Clione celata*), magnified.

spicules which occur so freely in the sponge, and of these I have given an illustration (fig. 147).

A little further on, and two different specimens of the homes formerly occupied by polyzoa were

secured. These are usually called sea-mats, of which one kind is so common everywhere. The larger of the two kinds now found is much more delicate than the common *Flustra foliacea*, figured in a former volume of this journal. It is named *Flustra truncata* (fig. 148), and when a portion of it is mounted in a cell, and examined with a low power



Fig. 148. *Flustra truncata*, nat. size.

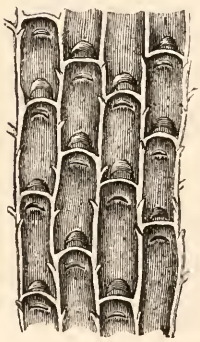


Fig. 149. Portion of same, × 60.

of the microscope, it is a very pretty object, even when all its inhabitants are dead and gone (fig. 149).

The second specimen was smaller, more tufted, still more delicate and fragile. It is *Flustra chartacea*, the Papery Sea-mat (fig. 150), more common on the coast at Hastings than on almost any other spot around Britain. Like its congener, this also, when magnified, is a very interesting object. What myriad inhabitants must have once tenanted this delicate little tuft, which is now blown along the sand with every puff of wind! And yet every one of these openings (fig. 151) was once the door of a tenanted dwelling.

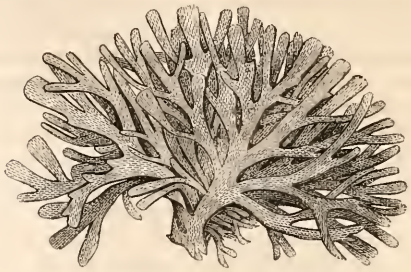


Fig. 150. *Flustra chartacea*.

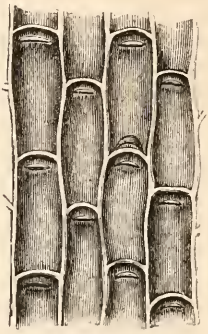


Fig. 151. Portion of same, × 60.

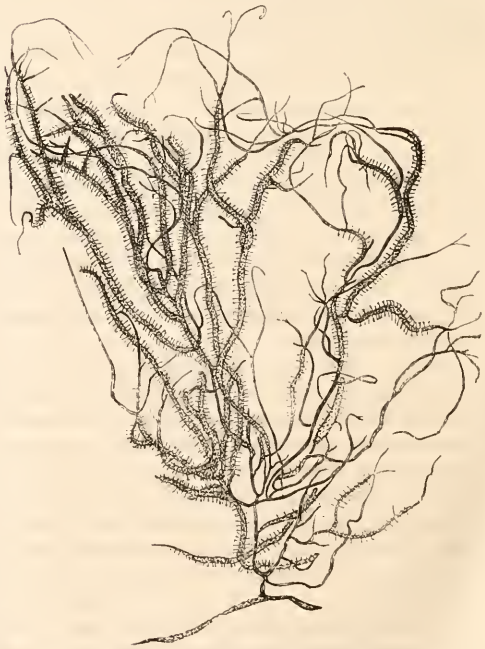


Fig. 152. *Membranipora pilosa* encrusting sea-weed, nat. size.

Passing on, I picked up seaweed of several kinds, nearly every specimen of which was encrusted with a coralline substance, bristling all over with long hairs. Hundreds of such specimens could have been collected in a few minutes, on large *Fuci* and *Laminaria*, as well as delicate Rhodosperms. Here was another example of homes without hands, for even the pocket lens showed the openings to hundreds of cells, armed at the mouth with long spines; and this commonest of zoophytes (as it is often called) was the *Membranipora pilosa* (fig. 152).

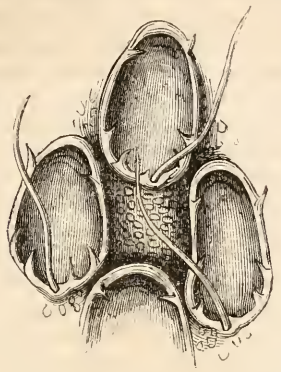


Fig. 153. *Membranipora pilosa*, × 60.

Here then are four very interesting and very common objects, each having its own story, and a marvellous one too, of low life beneath the ocean-wave. All these were picked up within a few yards and during an interval of not more than five minutes; yet, if their stories were fully unfolded, these would occupy as many hours. I wonder how many of the thousands that rush to Hastings, and such-like places in the autumn, and kick these objects along on the sand, ever think of the story that they could reveal, or dream of questioning them concerning the living wonders of the sea.

VALLEYS AND HILLS.

SINCE living at the embouchure of the lovely St. Austell valley, I have been often asked, why valleys during the night should be so much colder than hills around them; and as many educated persons to whom I have proposed the question have been at a loss for an explanation, perhaps the few following remarks on the subject may prove interesting to some of the readers of SCIENCE-GOSSIP. Heat, as is well known, has a tendency to expand all substances into which it enters, and thus the specific gravity of bodies will be lessened by it, so that heated air will be lighter than air of a lower temperature, and cold air will sink by its greater weight to the lowest place. Let us suppose that various atmospheric currents, of different degrees of heat, are commingling and rolling over the higher parts of a neighbourhood; it is clear that the valley, as the lowest place, will most probably get more than its proper share of cold vapours, by the simple laws of gravitation; and hence one reason why valleys at nights are often much colder than hills. Again, it is a fact, that to convert water into invisible vapour, six times 180° of heat are necessary, or six times the amount of caloric required to raise water from the freezing to the boiling-point; and as every cloud consists of this wonderful expansion of water, and watery particles, and store of latent heat, it is easy to understand, if clouds are more frequently condensed into rain on the hills than in the valleys, that the temperature of the more lofty districts of a neighbourhood must, in this way, be raised. Now, observation has proved that such is the case, and reflection shows why it should be so; for if the pressure of the atmosphere in the valley be 15 lb. on the square inch, when the barometer is at 30°, the barometer 1,000 feet up the hill-side would stand only at 29°, proving that $\frac{1}{30}$th part of the whole atmosphere existed in the stratum beneath, and if so, that the pressure at that height would be only 14½ lb. to the square inch; the air, therefore, 1,000 feet up, being less dense, would have $\frac{1}{30}$th less sustaining power of the clouds drifting through it; and if to this rarity from loss of superincumbent weight we add the steady decrease of temperature from dilutation of the air and loss of reflected heat from the earth itself, it is not difficult to understand why condensation should take place on the hill-sides. Of course, this explanation will apply only to moderate heights, to lines below perpetual snow, for the precise point must exist on every mountain, varying with its latitude, where the amount of caloric given out from condensed vapour will be more than counterbalanced by the cold caused by increasing dilutation of the atmosphere. Again, if it be true that valleys are colder than hills by night, they are much warmer by day, from concentration of the sun's rays and absence of fierce winds. And often, even in the night, when the thermometer notes many more degrees of heat on the hill-side, the temperature in the valley may be more endurable than the rapid evaporation caused by a dry wind; for it must not be forgotten, that whether steam be formed by the bubbling of boiling, or silently passes away by evaporation, the amount of caloric it carries with it is always the same, and the heat which makes it must be abstracted from something. Goethe makes the following sensible remarks in one of his letters from Italy:—"Auf dem flachen Lande empfängt man gutes und böses Wetter, wenn es schon fertig geworden, im Gebirge ist man gegenwärtig wenn es entsteht; denn nicht die Polhöhe allein macht Klima und Witterung, sondern die Bergreihen, besonders jene, die von Morgen nach Abend die Länder durchschneiden."

JOSEPH DREW.

AQUARIA.

"All the world's bravery, that delights our eyes,
Is but thy several liveries;
Thou the rich dye on them bestowest,
Thy nimble pencil paints the landscape as thou goest.

"A crimson garment in the rose thou wear'st,
A crown of studded gold thou bear'st,
The virgin lilies, in their white,
Are clad but with the lawn of almost naked light."

COWLEY.

I REALLY should feel delicate in asking space for more gossip on aquaria, had not a reader of your journal reminded me of an omission I made in my last letter.

I most certainly ought, when discussing the relative merits of real *versus* artificial sea-water, to have mentioned light, aspect, and form of tank, and as "Mr. B." has noticed this want, other correspondents may do the same, so I send up the result of my experience in these matters.

First of all, as regards the form of the aquarium, I prefer a perfectly plain slate one, the front and top alone being composed of glass: such an arrangement tends to keep the water cool, and only allows the light to enter the water through the surface. The *light falls on it*, does not come in sideways, as through a glass bowl or globe, and it appears to me to be a far more natural way of fitting up a home for creatures whose proper habitation is in the sea, where all the light they get must come from above, and reach them through water.

A *Blue*, speaking to me on this subject, once said, "All below is dark as night;" * and again, "Let but the surface of the sea be ruffled by a passing wind, and little if any light can be transmitted." It is all very well for scientific people to say this, and I will take it for granted that it is correct, for I am not scientific; but as most of the animals we stock tanks with do not reside in the "dark as night, deep below," but in shallow pools, and on rocks which are left partially uncovered by the retreating tide, where the glorious rays of the blazing sun must reach them, I like to procure for them, when in an aquarium, a fair proportion of light. No one who has watched sea-anemones expand their tentacles, under the influence of a bright sunshiny day, can doubt its being beneficial to them when it is properly regulated.

As the amount of water in a tank is comparatively small, too much sunshine would heat it, therefore some shading is needful. The window in which the aquarium stands should be opened at the top to admit air, and I like a green blind better than a white one.

The rock-work ought to be arranged so as to afford shade. Small caverns and miniature overhanging rocks are very easily made, and tufts of growing algæ give protection to some of the smaller zoophytes.

The heat of the water in the tank should be as nearly as possible that of the ocean, which is said to be 56 degrees, and never varies more than 12 in the entire year.

Many aquaria are made with sloping backs, in order to give the different animals various depths of water. I like to build the sloping back up myself, with rocks, shells, and seaweed.

The glass cover should be made in two pieces: they must not meet, as the space is necessary for the purpose of admitting air. Some people use coloured glass, and I fancy it does increase the colour in the seaweeds, especially if it approaches the sea-green in shade; but I always use plain glass, because I can distinguish the creatures in the aquarium so much better through it.

Aquarium thermometers are to be procured. I saw one lately which had been purchased at Negretti's, but whether at his stall in the Crystal Palace, or his place of business in town, I never thought of asking. It answered well. Perhaps it will not be out of place to add that a maker of very good *slate* aquaria lives in Anglesea (Mr. Edwards, of the Menai Bridge). The slate quarries near "Nant Francon," better known as the "Penrhyn quarries," supply the raw material. Fancy "Duchesses," "Countesses," and "Ladies," the titles given to slates of different sizes, being cut up and made aquaria of; why it is almost as bad as turning poor Princess Joan's stone coffin into a horse-trough! But thanks to the late Lord Batheley, it has been rescued from such degradation, and placed in a very pretty retired spot in the grounds of "Baron Hill" (Sir Richard Batheley's handsome residence near Beaumaris), to point a moral, and perchance adorn a tale; for where could romance find a darker episode, in all the records of history, whereon to found a story, than the legend of William de Beros and Prince Llewelyn's wife?

"The gorgeous pageantry of times gone by,
The tilt, the tournament, the vaulted hall."

HELEN E. WATNEY.

* If the sea is "dark as night below," how do divers (men, not the birds so called) see to work?

SQUIRREL *versus* MISSEL-THRUSH (p. 238).—The facts given by "G. H. H." under the above head cannot be considered conclusive, unless we are told that the squirrels he refers to were in a state of *nature*. I strongly suspect that they were not, and many animals, when under confinement, will adopt a different kind of diet to what they are accustomed when wild. For my part, I fully believe the squirrel is "not guilty" of the crime laid to its charge, and I am pleased that another correspondent (p. 237) takes a similar view of the case. —*H. C. Sargent.*

ZOOLOGY.

The Squirrel.—For many years I was of opinion, although a shooting man, that the squirrel was perfectly harmless,—that it was, strictly speaking, a vegetarian. I have, too, read works by shooting-men which mention the fact, that this beautiful little denizen of our preserves may be spared. But the other day I was rudely shocked. During a walk in the country I saw a commotion going on at the edge of a covert, and stepped in to see the cause. There were a little rabbit and a full-grown squirrel in full combat! Although the rabbit tried hard to shake off his opponent, the smaller animal had evidently the best of it, and no doubt would very shortly have put an end to the existence of his prey, for such I must perforce call it, had I not stepped in. The squirrel easily got away; not so the poor little rabbit, which had a severe wound on its head between the ears. After this, I am afraid, as a game preserver, I shall have small sympathy for the squirrel, however much he may contribute to the beauty of the country.—*F. A. F.*

Ring Ouzel (*Turdus torquatus*).—I saw a solitary specimen of this handsome and lively bird on Salisbury Plain on the 15th September, on my way to Stonehenge. Will any Wiltshire correspondent say if this bird is often seen? For myself, I never observed it there before.—*W. W. Spicer, Itchen Abbas.*

How Fishes breathe, is the title of an excellent article by John C. Galton, M.A., in the "Popular Science Review" for October.

Small Eggar (*Eriogaster lanestris*).—I thank my "Reading" friend, and also your correspondent "J. R. S. C.," for their notes on this moth in your last impression. It would be interesting to find out the cause of the mortality which is prevalent among the larvæ of this species. It is an extremely abundant caterpillar, but I do not recollect ever observing or capturing the moth on the wing. One would be led to suppose, considering the extreme abundance of the larvæ, that the perfect insect would be more frequently observed; but it appears to be quite the contrary—here at any rate—I don't know how it is in other localities. It would be interesting to me to know. I am inclined to share the belief of your correspondent "J. R. S. C.," and attribute it to a disease (which it would be interesting to find out if it could be) which tends to diminish their numbers. Newman on this species ("British Moths," p. 42), gives out,—"the moth appears *the following* February," which, according to my experience, is very rarely the case.—*R. Laddiman, St. Augustine's, Norwich.*

The Squirrel.—Really your correspondent George Cox ought to be highly complimented on the success of his spirited and clever analysis of my little story of the squirrel. Permit me to correct two errors in that gentleman's handling of the case. First, I am not aware that I stated in No. 80 that my friend "brought to my feet a bleeding misshapen mass." The expression would be capital for the *London Journal* or Miss Braddon's latest sensation, but hardly fit for Science-Gossip. The sportsman who killed that squirrel is acknowledged one of the best shots in England, and hit the animal in the head, so there was not much blood, if any, to be seen. Second, I did *not* say that "a ghost had been at mischief." There is no necessity for anybody to throw the ghost of a doubt upon my statement. Supernatural disappearances and ghosts I do not believe in, nor would any sensible person believe a ghost story upon any evidence, even Mr. Cox's own "ocular proof," I fear. That gentleman must try to realize the fact that there *are* some people in the world who speak the truth, even if they happen to be only gamekeepers; and that, fortunately for these poor fellows, there are masters who believe *them*, and can be *relied on in their turn*. However, I will write to my friend, who is a Dorset nobleman, and well known as a close observer of the habits of animal life, and he will, I have no doubt, prove beyond dispute that squirrels *did* and *do* eat the game eggs in his preserves. It is no visionary dream of ghost and goblin disappearance of the egg that I refer to, but a veritable gobbling of the articles named. Mr. Cox has surely never lived in the country, or he would have known that pheasants leave their eggs often in a very unprotected state. I should really be sorry to offer unpurchasable commodities for sale or publication, especially if my knowledge of natural history, small as it is, were as limited as my worthy questioner's! It must be a relief to the gentleman's mind to find that all the "*other vermin*," including the "old hedgehog," had been nailed to his barn-door "years ago.' Lucky man! There are only his pet squirrels left, and *they* are too pretty to grace a barn-door. Happy little squirrels! I hope they have plenty of nuts; and that for the sake of the pheasants' domestic peace there are no game preserves in the neighbourhood. Not that I would care to awaken Mr. Cox from his dream of the blissful innocence of the little animal. Surely he has lived long enough to find out that beauty does not always carry virtue with it. The most lovely, gorgeous, and elegant forms of creation are not always free from faults, or the best models to copy; perhaps, as in the case of our friend the squirrel, that very beauty and elegance are all the good qualities he possesses.—*Barbara Wallace Fyfe, Nottingham.*

P.S.—An old naturalist has just informed me that he has often observed squirrels eating the game eggs. He has lived in the neighbourhood of Newstead Abbey for years, and those grounds abound with game.

University of Toronto.—Dr. Alleyne Nicholson, lately Lecturer on Natural History in the Medical School of Edinburgh, has been appointed to the Chair of Natural History in this University.—*Edinburgh Courant*, 19th September.

Insects and Flowers.—When reading some papers on butterflies, by the Rev. J. Johns, in a monthly serial, I came across a paragraph in which the writer said that Brassicæ and other white butterflies had a predilection for settling on flowers of the same colour as themselves; and although I was at first inclined to doubt this statement, I resolved to watch for myself. The result was, that not only am I firmly convinced that Whites have a preference for white flowers, but, going further than this, I have noticed that a small bed of *Nemophila* has such attractions for the Blues as to prevent their settling on any other flowers. Moreover, we have in the garden a yew-tree which is entirely surrounded by lilacs and other shrubs of a bright foliage, and yet whenever a Red Admiral deigns to visit our demesne, he invariably makes for this yew-tree, where he is not only safe, but entirely invisible. I should like to hear if any other readers of Science-Gossip can give similar accounts.—*E. C. Lefroy*, 2, *Granville Place, Blackheath, S.E.*

Starlings built on St. Edmund's Vicarage, Gateshead-on-Tyne, in 1870, and, it is believed, raised two broods: they returned in spring this year, and built one or two nests; one male lost his mate (killed), and was very disconsolate for three days, found another, and raised the brood: they returned again in the summer, but it is not quite clear if a second brood was raised: they returned again in September, and were noticed on the house, singing and calling, Oct. 4; and this morning, Oct. 6, 1871, the young birds (three) were out on the roof sunning themselves and trying their wings. Is it usual to breed so late? and so far north? Do they remain all the year? and how many broods do they usually raise? I have not seen swallow, martin, or swift this year.—*H. O. S.*

Parasites on Arge Galathea (p. 233).—I am glad Mr. Anderson has called attention to the scarlet parasites found on *Arge Galathea*, for among other good but unfulfilled intentions, which want of time or more pressing business has prevented my carrying out, is the connection or non-connection between *Tetranychus lapidus* (Stone Mite) and the bright scarlet parasite found on *Arge Galathea* and other lepidoptera. I say other lepidoptera, because I have found it on *Satyrus Semele* (Grayling), *S. Megæra* (Wall Argus), *Chortobius pamphilus* (Small Heath), *Lycæna Corydon* (Chalk-hill Blue), *L. Adonis* (Clifden Blue), *Vanessa Atalanta* (Red Admiral) once, *V. urticæ* (small Tortoiseshell) once, *Bryophylla perla*, *B. glandifera*, *Plusia gamma*, *Mamestra persicariæ*, *M. brassicæ*, &c., as well as on *A. Galathea*. It is a noticeable fact that all, or nearly all, the above settle frequently on the ground; some, in fact, like *S. Semele*, rest on stones Moreover, I have taken insects on the Downs, Box Hill, the limestone hills of Derbyshire, &c., with the scarlet parasite on them, and invariably have found a very large proportion of the flints, stones, or pieces of rock lying about, covered or partially covered with the beautiful eggs of *T. lapidus*. The first time I noticed the parasite was some years ago, on Box Hill, when my attention was attracted by the peculiar flight of a male of *S. Semele*, upon securing which, I found two scarlet parasites at the junction of the head and thorax. Since then I have found them attached to the thorax, abdomen, and the under-side of the wings; in fact, I have in my cabinet a slide of the wing of *B. perla*, on the under-side of which are three of the scarlet parasites. The more common position on the wing is near its junction with the thorax. Now, seeing there is a striking resemblance between *T. lapidus* and the scarlet parasite, I have thought that they either were the same, or, at least, one of the *Tetranychi*. Whether they derive nourishment from the insects they infest, I cannot say, but they undoubtedly are a source of annoyance, or, at least, a means of retarding the flight of the insects, which move at a much slower rate. I had almost forgotten that a house-fly was brought to me about two years since with a similar scarlet parasite upon it.—*T. W. Wonfor, Brighton.*

Golden Oriole.—A pair of these birds were observed at Martlesham, near this town, this summer by a gamekeeper, at the time of the pheasants' sitting; so in all probability they were nesting. The man's attention was called to them by hearing, day after day, in a certain place, what he thought was some one whistling to him; and at length following up the sound, he saw what he called the "yaller gentlemen" on a tree; of course (!) he fired his gun at them, killing the hen bird only; the male escaped, and disappeared from the neighbourhood. I think the above fact worth recording, as there can be no doubt that had these pretty birds been left unmolested, another authenticated instance of their breeding in this country would have been established. I may add that I have seen the hen bird, which has been preserved by Mr. Podd, naturalist, of this town.—*H. Miller, Ipswich.*

A Chicken with four legs was hatched this spring in this neighbourhood. It was to all appearance perfectly formed in other respects, the second pair of legs being behind the ordinary ones, and having three joints. It would have been curious to have examined the little creature's anatomy, but I did not see it till it was shown me by Mr. Podd, who had preserved it.—*H. Miller.*

BOTANY.

Locust-tree.—In the garden of the rectory at Byfleet, Surrey, is a remarkably handsome acacia (*Robinia pseudacacia*), of which I took the dimensions last week. At four feet from the ground it measured 13 feet 4 inches in circumference. Is not this a most unusual size for this tree to attain?—*W. W. Spicer, Itchen Abbas.*

Plant Names.—Our contributor, Mr. James Britten, F.L.S., formerly of Kew Gardens, should be addressed at the Botanical Department of the British Museum, London, W.C.

Local Floras.—Some useful chapters on this subject have appeared in recent numbers of the *Gardeners' Chronicle*, to which we refer those of our correspondents who seek further information.

Abnormal Cerastium. — Specimens received and forwarded to Mr. R. Holland. The following is his relpy:—The Cerastium (?) found by your correspondent "G. S. S." is a very good and not very common example of Phyllody of sepals, petals, and in many cases of stamens and pistils. When a plant becomes so greatly altered in appearance as this is, it is rather hard to give it a name; but I am inclined to think that it is no *Cerastium* at all, but an *Arenaria*—probably *A. serpyllifolia*, as shown by the *short* capsule in those flowers that appear to have seeded, and by the older flowers growing in the forks of the branches. The *Cerastiums* have capsules much longer than the sepals, and in the commoner kinds the capsules are very characteristically curved; and these are neither one nor the other. The plant may have been in a normal state up to a certain time, and then taken on this foliaceous condition, on account of the quantity of rain; and the earlier flowers may doubtless have had petals. But their having seeded does not in the least show that they had petals. They might have seeded if only the pistil were perfect. There are scattered over the plants many foliaceous flowers, which contain, apparently, perfect stamens and pistils, and these would most likely have produced seed. Your correspondent mentions that he found the plant "in large quantities;" and from this fact I should rather believe that what he found were seedlings from a similiarly foliaceous plant of last year, and that they had inherited the peculiar condition of their parent. The rainy weather would scarcely have caused such a number of plants in a limited space to have all become monstrous together, though some peculiarity in the soil might have done so. Foliaceous clover-flowers are plentiful every autumn. They appear chiefly in the *second* crop, so that the cutting of the first crop and the quick growth of the soft and succulent second crop have probably something to do with producing the monstrosity. This year such examples have been more than usually common—no doubt from the superabundance of wet. *Trifolium pratense*, *T. repens*, and especially *T. hybridum*, have been *very* proliferous; but I have not seen a single example in any of the yellow trefoils; indeed, I do not remember that I have ever seen a yellow trefoil becoming foliaceous.—*Robert Holland.*

Cystopus lepigoni.—I found this fungus on *Spergularia marina* at Fareham, Hants, on 18th of September last. I believe that Swanscombe, in Kent, is the only locality previously recorded.—*F. J. Warner.*

The Bee Orchis.—This beautiful flower is common in this neighbourhood on the barren wet marls of the forest marble and fuller's earth, and also on the chalk downs. It is, however, a very uncertain bloomer: one year it is met with abundantly; another, as the present, it is hardly to be found. The profusion of Orchideæ on our marly soils contrasts strongly with their scarcity in the London district: in one field I can count twelve species, including *Spiranthes autumnalis* and *Herminium Monorchis*.—*H. F. Parsons, Beckington.*

Transmission of Fresh Flowers by Post.—I have found flowers keep fresh for long distances, if wrapped up in oiled silk or sheet gutta-percha. The ends of the stems should be wrapped in damp cotton wool, and the overlapping edges of the oiled silk gummed down all the way round.—*H. F. Parsons.*

Rare Plants.—I am sorry that Mr. Delaney should think that in giving publicity to one of the localities where the Bee Orchis is to be found, I had made any unadvisable use of my information. I entirely agree with Mr. Delaney in the main, but think that in this instance he carries his theory somewhat too far, whilst endeavouring to guard against those persons whose object, as he describes, "is to secure for their own selfish gratification any rare plant." We must also remember, on the other hand, that there are many others to whom such knowledge would be really a service, and whose good sense and moderation might fairly be trusted, amongst whom the generality of the readers of Science-Gossip I think might be classed.—*J. S. W., Durham.*

[During the past week facts have come to our knowledge of more than one instance in which botanists (and not dealers) have eradicated rare ferns from certain localities by their rapacity. Let us hope that such cases are rare.—Ed. S.-G.]

MICROSCOPY.

Micrographic Dictionary.—The attention of our microscopical readers is directed to the fact that a new edition of the well-known "Micrographic Dictionary" is now in course of publication by Van Voorst, in monthly parts, of which two have already appeared. This work is too well known to require commendation, and is, in fact, not only a standard book, but the only one of the kind at all comprehensive in character.

Amplification (p. 236).—"F. A. F.'s" remarks are certainly not uncalled for, more especially as a variation of magnifying power frequently alters the appearance of an object so entirely as to make it unrecognizable; but, even when the magnifying power of an instrument tallies approximately with that of a given engraving, it but too often happens that a large allowance must be made for the imagination of the artist, who fills in the details according to his idea; also difference in size, &c., must be allowed for, as illustrations would naturally be made from the best and most perfect specimens obtainable, which may be beyond the reach of the talent or purse of the amateur.—*E. P. P.*

Scale of Perch.—Although on a former occasion we gave an illustration of this favourite fish-scale, it was not on the whole satisfactory, and would not compare with the scales recently figured, in point of art. We have now produced a more

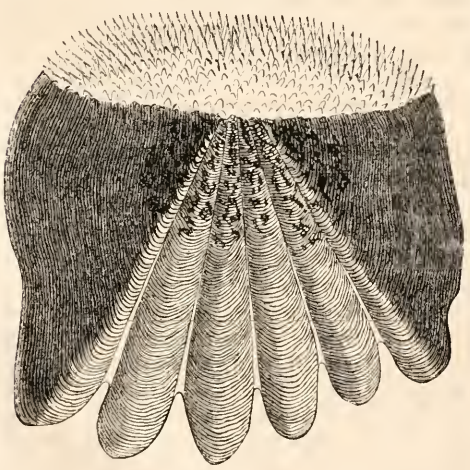


Fig. 154. Scale of Perch.

worthy portrait of this scale, which has so deservedly obtained a name and place in almost every collection, and with it we fear that our examples of the scales of fresh-water fishes have almost come to an end.

Nostoc.—Surprise has been excited in the minds of some of our correspondents on account of a green gelatinous substance found recently, after rainy weather, upon grass, gravel walks, &c., and which some have supposed to be a fungus. This is really one of those curious organisms which the scientific call *Nostoc*, and which they refer to the Algæ, or family of Water-weeds. There are several species of them, and five or six have been found in Britain, one or two being purely aquatic. The internal structure in all is remarkably alike, consisting of beaded, undulating threads, immersed in gelatine. There is a great deal connected with the life-history of these bodies which requires working out, and many points deserve study and investigation. It will be observed, on examining the substance with a quarter-inch objective, that the threads are made up of a series of spherical bodies, which are coloured,



Fig. 155. *Nostoc commune*, nat. size.

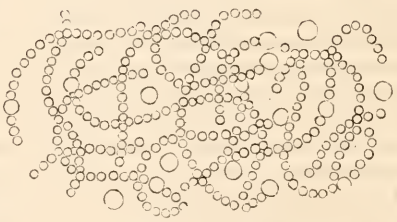


Fig. 156. *Nostoc commune*, × 320.

and slightly attached to each other, like beads on a string. Here and there one sphere is larger than the rest, and often these larger spheres are also free from the threads, amongst the gelatine. It is more suspected than really known that these larger bodies are concerned in the reproductive process, and that they are sporangia, or something of that kind. Our object now is to indicate that these green gelatinous masses are called *Nostoc commune;* that they have constituted in some countries (China, for instance) a portion of human food; and that any one with leisure will find in them an object worthy of study and elucidation.

NOTES AND QUERIES.

Blue-bottles once more.—Can you, or any of your many practical readers, help me in the removal of what is to me a very great nuisance? In Science-Gossip, vol. iv. page 234, and vol. v. page 262, I have given a description of my "plague of flies," to which, for local particulars, I would refer. Last year, 1870, during ten or twelve days in August, I caught in my study 3,303 blue-bottles—viz., August 6th, 497; 8th, 341; 9th, 470; 10th, 437; 12th, 415; 13th, 453; 15th, 130; 16th, 360; 17th, 205; and smaller numbers afterwards: but I was from home all September, and after that the weather was colder, and they disappeared. This year, 1871, they have been worse than ever. The 3rd of March was very mild, and I caught 555; but after that, until the 7th of August, their numbers were not important. On the 7th I caught 750; 8th, 500; 9th, 783; 10th, 568; 11th, 750; 12th, 1,032; 14th, 1,600; making 5,983 in a week; when I was compelled almost to abandon my study, and leave the blue-bottles in full possession. No matter whether the windows were open or shut, in they came, through every crevice; and though I cleared the room at dusk, as soon as I lighted the gas, they were out again, buzzing through the flame, and falling wingless and spinning on my writing-paper; so that *study, in my study*, became an impossibility. I should be glad to know what induces them to come; and if any one can suggest a remedy, or how I am to get rid of what is now an intolerable nuisance.—*H. O. S., St. Edmund's Vicarage, Gateshead.*

Stings.—Will any of your readers kindly refer me to any book which gives an account of the *action* of the various stings, beginning with that of the nettle? I want to know how the poison gets into the wound so rapidly when an insect stings you, and, in the case of the nettle, if there is any poison, and the mechanical action which takes place; in short, I want to know "all about it."—*J. W. W.*

Cystea montana.—The Rev. Hugh Macmillan, in his book "Holidays on High Lands," at page 67, says of this plant: "Its original centre of distribution seems to be the Rocky Mountains of America, for there it occurs in the utmost luxuriance and profusion." Will this author, or any of your numerous readers, give, through your columns, the authorities for this statement of fact? In the "The British Ferns," Sir Wm. Hooker says, "We possess five specimens from the east side of the Rocky Mountains, gathered by Drummond;" which is all that is known here of its occurence in that locality.—*D. W.*

Bait for Soles.—"C. L. J." will find that soles will take any of the following baits:—Soft crab, soldier-crab, lug-worm, mussel, shrimp, and rag-worm. The most killing bait I am acquainted with is the tail of the soldier-crab; but he must have proper gear, and must fish at the proper time, or he must not expect to get a bite. Soles are caught by the trawl at all times and seasons,—they cannot escape from that ruinously destructive engine; but they only come to the hook when they are themselves searching for food. They are mostly "on the feed" at night, and it is useless to put lines out for them on bright sunny days, when the water is as clear as crystal. Hardly any kind of fish will bite when the sunlight penetrates freely to the bottom of the water. For sole-fishing especially, the most favourable time is after a blow, when the water is thick; and a land breeze answers better than a sea breeze. All sea-fish bite more freely after a heavy blow, in the first lull after a gale, and while the water is still turbid from the commotion. The soft tail of the soldier-crab (*Pagurus Bernhardus*) is the most seductive bait I know; and long gut snoods should be used. The "Trot," *alias* "Boulter" or "Loug Line," laid out in the evening, is the most effectual contrivance, next to the trawl, for catching ground fish. The "Ledger-trot" is a capital contrivance for amateurs who do not care to be out late, and to be bothered with the entanglements of the "Trot" proper. These "gut ledger trots, for flat fish," are admirably fitted by Mr. Hearder, of 195, Union-street, Plymouth, at a very moderate charge. Another plan is to fasten a gut snood, four or five feet in length, to an eye or loop in a common lead sinker. The latter is allowed to rest on the bottom, being slightly raised occasionally to feel for a bite. The snood is furnished with a hook at the end, and with one or two other hooks knotted on at intervals. Flat fish are very inquisitive. The moment one is hooked, or is busy sucking at a bait, half a dozeu others are sure to come to see what he is about, and to commence searching all round him. It is pleasant to haul up two or three good broad-backs at a time. The sole does not strike at the bait, but sucks it in, and requires time to hook himself. The flesh of the *Pecten* is used for a bait in some places. Let our friend "C. L. J." examine the contents of the stomachs of half a dozeu soles taken in his neighbourhood, and he will soon find out the best bait. He must remember that, like most other fish, they do not bite all the year round. They are biting freely now on this part of the coast. We shall be glad to hear if he meets with any luck with the "ledger-trot" and the "tail of a sojer." The infernal trawls are exterminating our coast fishes. The next time "C. L. J." goes out in a trawler, let him count the number of well-grown marketable fish taken during the trip, and let him also count the number of immature fish and young fry that are hauled up and destroyed, being either dead by the time they are hoisted on board, or left on the deck until they die; and let him publish the result in Science-Gossip, or send it to me. If the fishermen would only take the trouble to put back the young unripe fish into the sea alive, the murderous mischief would be much lessened; but, as it is, they destroy the young fish, by tens of millions, in the most careless, reckless way. Shall we ever be wise enough to protect our sea fisheries as we have protected our salmon fisheries? I suppose we shall not. The salmon rivers mostly belong to powerful corporations and wealthy and influeutial landed proprietors, who have both intelligence and interest enough to obtain protection for their own fisheries; but the sea, the poor man's fishery, is harried by every description of poacher, in season and out of season; and the laws thereanent, though sufficiently stringent, are allowed to lie dormant. They have become a dead letter; and the fish are nearly extinct on some parts of our coasts.—*Major Holland, Bury Cross, Gosport.*

Preserving Grasses, &c.—Some kind reader of Science-Gossip would greatly oblige by informing me what preparation is used to preserve grasses, ferns, &c., for the decoration of cases of stuffed auimals.—*Robert Laddiman, Norwich.*

Kestrel's Egg (p. 237).—In answer to your correspondent "C. H. G.," I beg to say that it is a very common occurrence for the markings on birds' eggs to disappear on being wiped or rubbed, particularly if the rag or towel be used when wet. The spots on the eggs of the chaffinch, the buntings, and some of the hawks, are easily rubbed off. Red markings are more easily rubbed away than other colours. By red I also mean purple-red, brownish-red, &c.—*W. H. Warner, Kingston.*

Oak Eggar (p. 238).—Is "R. L. N." aware that the caterpillar of this moth hatches in August, hybernates through the winter, and appears in March; consequently that its appearance in the third week in April is nothing unusual? My note on p. 161 was not inserted in the light of a query, but merely to register what I then considered as a somewhat uncommon occurrence; but now I find I was mistaken, as Mr. Henderson mentions having had a pupa of this moth on one occasion so early as May 7th, while at the time of my writing the note (May 6th) my caterpillars had not even spun their ocoons.—*W. H. Warner, Kingston.*

Cleaning Skeletons.—I have read that a good method of cleaning the skeletons of small animals—fish, for instance—is to suspend them horizontally in a jar of pond-water in which a couple of dozen or more hungry tadpoles are revelling. A few months ago I saw a great number of these voracious little reptiles busily engaged on what had once been a large rat. The process would no doubt be further advanced by previously skinning the specimen. Probably minnows would answer as well as tadpoles. The water in the jar should be changed occasionally.—*W. H. Warner, Kingston.*

Clausilia parvula.—A correspondent of Science-Gossip some few months since, unless I am much mistaken, expressed a desire for specimens of this shell. This morning I have just discovered a few, collected in Heidelberg some years since: if he will send me stamped and directed envelope, I shall have much pleasure in forwarding him half a dozen specimens.—*John E. Daniel, 6, The Terrace, Epsom.*

A Gigantic Duck Egg.—The *Manchester Guardian* of the 4th October contains the following paragraph:—"Mr. Thornhill, of Crumpsall Green, near Manchester, recently found one of his ducks dead upon her nest. She had been ailing for some months, and could neither eat nor lay. The body was opened, and there was taken from it an egg, which we have seen, and which measures 18½ inches in its greater circumference, 15¾ inches at the smaller circumference, and its capacity is 2¼ pints of water. It contained three yolks, and after they had been drawn the shell weighed eight ounces. The duck was a cross between a Muscovy and an Aylesbury, of the ordinary size."—*G. H. H.*

Parasites on Arge Galathea (p. 233).—Although the heading of my communication on this subject in last month's Science-Gossip is correct, there are one or two typographical errors following, which may tend somewhat to mislead. The parasites were "on," not "in," the specimens I examined.—*Joseph Anderson, Jun., Alresford, Hants.*

Colour of Eggs (p. 237).—I can inform "C. H. G." that I have found the colour of many eggs will come off, especially if wiped soon after they have been laid. I have frequently tried this with the eggs of the Song Thrush, and have removed a great portion of the spots. After an egg has been kept some little time, the colour becomes firmer set. The markings of the Hawk's egg are particularly liable to removal.—*J. A., Jun., Alresford.*

Erratum, at p. 221.—For *Sertularia geniculata* read *Sertularia pumila.*—*O. M.*

Snake's Skin.—On September 19th I found a very fine cast-off skin of the common Ringed Snake (*Natrix torquata*) whilst searching for insects on the Oxfordshire hills. It measures 3 feet 5½ inches, though a little must be allowed for its stretching when pulled off; it is quite perfect down to the skin of the lips and eyes, and may be inflated like a balloon. I found it so entangled amongst rank grasses, *Alopecurus* and *Phleum pratense*, that it was not easily extricated. As it is such a large specimen, perhaps the above notes may interest naturalists or lovers of reptiles.—*John Henderson.*

Hawfinch.—The other day I saw a pair of eggs of this bird in a friend's cabinet; they were taken in a fir plantation, about five miles from Reading, in May, 1869. I have a stuffed male in good plumage, which was shot in Worcestershire; and some years ago the head of another was brought to me for identification: this last came from an orchard near Earley, Berks.—*J. Henderson.*

Egg of Kestrel (p. 237).—"C. H. G.'s" communication is by no means a singular one. I find the colouring matter will come off the shells of Merlin, Sparrow-hawk, Carrion Crow, Plover, and several others besides the Kestrel. One of my eggs of the latter hawk is of a very rich dark brown, and another is of a white or cream colour.—*J. Henderson.*

Worms.—In a lecture delivered in Manchester in 1866 or '67, Dr. Alcock said,—speaking of the common earthworm,—"I was surprised to see that a very considerable number of the worms I obtained had new tails: it was evident they were not the original tails, because they were badly fitted; they were smaller in proportion than the rest of the body, as well as paler in colour;" and further on he says, "The worm goes back into its hole, and grows a new tail." But the Rev. J. G. Wood, in "Common Objects of the Seashore," folio 95, says of the earthworm, that it "is not capable of producing a fresh tail, or even of forming a single fresh ring." Have any of your readers any experience as to which of these statements is correct, or can they refer to other authorities on the subject?—*E. P. P.*

Deiopeia pulchella.—Mr. J. Gatcombe, at page 239 of Science-Gossip, states that the caterpillar of *Deïopeia pulchella* has never been taken in this country. I beg to undeceive him, and acquaint him that in the year 1842 a lady of my acquaintance took no less than *nine* on a clump of the field Forget-me-not (*Myosotis arvensis*) in a field between Isleham and Fordham, in Cambridgeshire. They were retained for some time in the breeding-cage, and when just in that restless stage which precedes their change to the chrysalis, they were unfortunately lost through the stupid curiosity of a servant-boy, who left the cage-door open in a hurried flight to

escape the detection of his prying. Both the lady and myself well knew the larvæ from description and drawings. I may add we became well acquainted with it in Ceylon subsequently; also that it is found at the Cape of Good Hope.—*E. L. Layard.*

Small Eggar.—It may interest Mr. Henderson, of Reading, to know that the experiences of a brother lepidopterist this year, in the rearing of the Small Eggar, have resembled his own. I took a large colony of the larvæ from a thorn in the early summer. They were quite young, and fed and prospered in the most hopeful manner up to the last moult; then, one by one, they became flaccid and thin, and died, generally collapsing in the middle, and hanging across a twig of the food-plant. I cannot tell whether any passed into the pupa state, unobserved by me, as my breeding-cage is a large one, and, in the season, occupied by a great number of larvæ, and large branches of various foliage; but my fear is that I am not destined to be the happy possessor of *Eriogaster lanestris* from this gathering. I left at least a third of the colony in their natural habitat, so I have the satisfaction of feeling that I have not exterminated a whole brood.—*H. G. W. Aubrey.*

Fox-moth Larvæ (*Bombyx rubi*).—From information received, I visited Mablethorpe, on the East Lincolnshire coast, to see (as my friend said) the caterpillars. I must say I never saw such a sight; although I have been a collector and breeder for a long time, I have never found one of the Fox larvæ in this part of Lincolnshire before. I found them feeding in thousands on the sea-buckthorn or common sallow-thorn (*Hippophäe rhamnoides*), a shrub growing in patches very plentifully on the sea-hills. I also find this (to me) extraordinary circumstance is not confined to Mablethorpe. I found them very plentifully at Sutton, Huttoft, and Chapel, two, four, and seven miles distant. I have made every inquiry of the natives, but cannot find any one who ever saw them before. The food-plant seems (to me) worthy of consideration. I have never heard of this species feeding on the sea-buckthorn: bramble is generally described as its food-plant. This also grows very plentifully on the sea-hills, but not one larva could I find on the bramble. I collected about 600, and have them now (Oct. 3), feeding. After allowing the sea-buckthorn to get stale, I gave them fresh bramble and sallow: a few took to the sallow, but less to the bramble. Again giving them the sea-buckthorn, they at once left the other food. This being a hibernating species, I shall be very glad to hear from any collector on the best manner of treatment.—*R. Garfit, Market Square, Alford, Lincolnshire.*

Woodlark (p. 233).—With reference to an article, by Mr. Drew, on this bird, I am pleased to say that it is by no means uncommon in this part of Hampshire.—*J. A., Jun., Alresford.*

The Clifden Nonpareil (*Catocala fraxini*).—This beautiful moth being a rare British species, I thought it would not be uninteresting to many readers of the Science-Gossip to know that a very fine specimen of it had been captured in this part of Lincolnshire. A friend of mine, who had the pleasure of capturing this gem (being no entomologist), sent it to me on September 17 (at the same time asking if it was any use), with the following remarks: "I was standing yesterday in the Gas-house yard, Hodgethorpe (7 miles from here), when this moth dropped from a building; it was very weak, and could not fly. I took it up by its legs; it appeared to gather strength quickly: I conclude it had just come out of its shell."—*R. Garfit, Market Square, Alford, Lincolnshire.*

Bath White.—It may interest some of your entomological readers to hear that a very fair specimen of the Bath White (*Pieris daplidice*) was caught on Friday last in a field at the end of the "Lias" at Folkestone. The lucky captor was, as usual, a young and inexperienced collector, who mistook it at first for an ordinary small garden-white. The specimen is now in my brother's collection.—*Jacob John Jonas, Sept.* 5, 1871.

British Tortoises.—In the autumn of 1862 the female of a pair of tortoises, kept in the garden of Wm. Williams, Esq., of Tregullow, Cornwall, was observed by the gardener laying some eggs in the border of one of the paths; he removed them in a flowerpot to the hothouse, where, in time, two minute tortoises were hatched. About the same time the following year one more was reared, the previous two at that time being active and healthy. —*H. Budge.*

Squirrels.—As a lover of squirrels, there is a point I should very much like to see cleared up, but which has not been alluded to by any of your correspondents who have recently written about these interesting rodents. Is it a fact that the squirrel nibbles off the young shoots of pines and firs to such an extent as to strew the ground? This is the reason I have frequently heard given for the order for their extermination; and if the charge is correct, it appears to me to be a much more serious one than the occasional taking of eggs, or even slaughter of small birds.—*W. E. L.*

Canine Predilection for Fruit.—We have a little terrier which is remarkable for a very bad temper and a great liking for all kinds of fruit, but especially gooseberries and nuts. She will go to a gooseberry-bush, pick the ripe fruit, suck them, and reject the skins; she will also search under the nut-trees for any fallen clusters, free the nuts from their husks, crack them with her teeth, and extract and eat the kernels.—*W. M. A. W.*

NATURALISTS' FIELD CLUBS.

Belfast Naturalists' Field Club.—William Gray, 6, Mount Charles, Belfast; Hugh Robinson, 3, Donegall Street, Belfast, Honorary Secretaries.

Peterborough Natural History Society.—Secretary, Mr. H. English, Palmerston Road, Woodstone, Peterborough.

Birmingham Naturalists' Field Club.—Alfred Shrive, 66, New Summer-street, Birmingham, Honorary Secretary.

Liverpool Naturalists' Field Club.—Rev. W. Banister, B.A., Royal Institution, Liverpool, Honorary Secretary.

Woolhope Naturalists' Field Club.—Arthur Thompson, St. Nicholas Street, Hereford, Assistant Secretary.

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer,* not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them.

B. W. P.—The eggs of some insect.

A. B.—1. *Coleosporium Tussilaginis.* 2. Oak spangles (galls). 3. *Plocamium coccineum.*

W. W. S.—Larva of *Strachia splendida*, Blanch., the range of which extends from Mexico to Rio Janeiro.

St. E.—Consult any elementary work on optics.

H. W. M.—Without charge.

S. R. The same thing has been recorded in our pages.

F. J. W.—A common monstrosity of *Juncus squarrosus.*—*B.*

J. S. R.—*Poa procumbens.*—*B.*

R. McK.—1. *Brachypodium sylvaticum*, with shorter awns than usual. 2. Difficult to determine,—it is not typical *Erythræa pulchella.* 3. *Equisetum palustre*, β. *polystachyon.*—*B.*

E. B.—We do not know the object to which you refer.

H. W.—Country life has long since gone out.

A. H.—Not "in our line."

W. A. C.—Egg-case of Cockroach.

F. S. wants to know why honey is sometimes pink in the comb.

W. N.—White moles are not great rarities. The other query, we regret that we cannot help you.

C. H. M.—We think that enough has been done.

T. W. H.—We gave in a former volume all the information which could be obtained on methods of preparing caterpillars for the cabinet.

F. B.—It is a fungus called *Rœstelia cancellata.*

C. E.—A marine plant, *Zostera marina.*

W. H. W.—It was received.

J. L.—By a rose-cutting Bee.

H. N.—Carpenter's "Use of the Microscope" (price 12s., Churchill) will answer both purposes. We never recommend opticians to our subscribers.

B. B., Jun.—The Candle-snuff fungus, *Xylaria hypoxylon*, figured in the present volume.

J. D. T.—Mudd's "Manual of British Lichens" (now out of print). Lindsay's "Popular History of British Lichens" (Routledge). Leighton's "British Lichens" (just published at 16s.).

J. S. R.—The grass is a *Sclerochloa*, probably *S. procumbens*, Beauv., but in a bad state for examination. 1, 2. It is impossible to name ferns from scraps of barren fronds.—*B.*

T. W.—Can you send better specimens?—*B.*

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Campanula patula and *Hymenophyllum Wilsoni* for other British plants.—F. T. Mott, 1, De Montfort Street, Leicester.

European Lepidoptera.—For price-list of European specimens of rare British and allied species of Lepidoptera, enclose stamped directed envelope to H. W. Marsden, Regent Street, Gloucester.

Gagea lutea, *Draba muralis, Actæa spicata, Carex digitata, C. pruadoxe*, &c., in exchange for other British plants.

British and Foreign for British Lepidoptera.—Send lists of collection and duplicates to E. C. Lefroy, 2, Granville Place, Blackheath, S.E.

Ancylus fluviatilis, var. albida, in exchange for British shells.—C. Robinson, 22, Broughton Road, Salford.

Mosses from Scotland for British or European Mosses or *Jungermanniæ.*—T. H., Highfield, Sydenham Hill, London.

Fronds of various ferns, showing fructification, for other good objects.—W. B. Marshall, 16, Chaucer Street, Nottingham.

For Dendritic Spots on paper send stamped and directed envelope and object of interest to H. Gilbert, 45, St. George's Road, Peckham.

Polariscope Crystals, Mounted, wanted for Spicules of *Gorgonia Hommomello* and others named.—W. Freeman, 165, Maxey Road, Plumstead.

Wanted Microscopic Slides for unmounted material, scales of sea fish, &c.—Rev. Samuel A. Brenan, Agolagh, Cushendun, co. Antrim.

Pyrola rotundifolia wanted for ferns, as per list, on application to F. P. Fernie, Kimbolton.

Cornbrash Fossils for others from chalk, greensand, &c.—H. English, Woodstone, Peterboro'.

Trichobasis fallens and other Micro-fungi for stamped envelope and object of microscopical interest.—J. Sargent, jun., Fritchley, near Derby.

Wanted, Greenhouse Ferns in exchange for other varieties of greenhouse ferns, names given and required.—Address, M. M., Post-office, Faversham.

Storm-tossed Scraps from the south-western beach unnamed and unassorted.—Send large directed envelope to I. C. W., Montpellier House, Budleigh Salterton, South Devon.

Pupæ of *S. ligustri* offered for Pupæ of *Sphingina* or *Bombycina.*—Send lists to W. Duncombe, Wincanton.

British Birds' Eggs.—Eggs of green woodpecker, goat-sucker, sparrow-hawk, &c., for black grouse, ptarmigan, hobby, &c.—H. Miller, jun., Ipswich.

Parasite of Beetle, *Gamasus coleoptratorum* (mounted), for other well-mounted slides; diatoms preferred. Enclose stamped address to C. H., 37, Devonshire Mews West, Portland Place, W.

Two good entomological slides offered for *Navicula sigmoidea*, or *N. Spencerii*, or *N. lineata.*—C. D., 187, Oxford Street, Mile End, E.

Coleoptera.—Wanted *Leistus ferrugineus*; others in exchange.—Joseph A. Kershaw, Spring Gardens, Brighouse, Yorkshire.

BOOKS RECEIVED.

"The Popular Science Review," for October, 1871.

"The Monthly Microscopical Journal," for October, 1871.

"Land and Water." Nos. 358, 359, 360, 361.

"The Journal of Applied Science," for October, 1871.

"Rudimentary Treatise on Geology." Part I.—Physical Geology, by Ralph Tate. Weale's Rudimentary Series. London: Lockwood & Co.

"On 'Wants' in Ironstone Seams, and their connection with Faults." By Robert L. Jack, F.G.S.

"Das Innere von Grönland," von Dr. Robert Brown.

"The Animal World," for October, 1871.

"The Australian Medical Journal," for August, 1871.

"The Canadian Entomologist." Nos. 5 and 6, 1871.

"Boston Journal of Chemistry," for October, 1871.

"The Micrographic Dictionary." Third edition. Edited by J. W. Griffith, M.D., Rev. M. J. Berkeley, M.A., and T. Rupert Jones, F.G.S. Parts I. and II. London: Van Voorst.

"Bird Life." By Dr. A. E. Brehm. Translated from the German by H. M. Labouchere, F.Z.S., and W. Jesse, C.M.Z.S. Parts I. and II. London: Van Voorst.

"The Canadian Naturalist." Vol. VI.—No. 1.

Communications Received.—M. H.—E. B.—J. A.—J. W. W.—H. O. S.—M. W. E.—S. S.—L. S.—E. F. E.—J. P. H. B.—E. C. L.—J. B.—J. S. R.—B. W. F.—A. B.—W. H. W.—H. L.—H. W. M.—St. E.—F. T. M.—J. L.—T. W.—H. E. W.—H. F. P.—R. E.—J. R. S. C.—T. C. O.—W. C.—W. F.—H. T. C.—J. E. D.—H. C. S.—J. P. F.—A. H.—J. A. Jun.—A. C. K.—W. H. W.—H. G.—J. S. W. D.—E. L. L.—T. W. W.—O. M.—G. H. H.—W. B.—E. P. P.—W. M. H.—R. L.—W. B. M.—E. C. L.—T. W. H.—C. H. M.—S. A. B.—H. O. S.—T. H.—R. G.—W. A. C.—C. R.—W. N.—F. S.—C. E.—J. S. R.—F. B.—B. W. P.—H. M.—M. M.—H. N.—W. D.—J. C. W.—J. S., Jun.—H. E.—H. B.—B. B., Jun.—J. A. K.—W. H. L.—W. E. A.—J. D. I.—G. G.—A. N.—W. W. S.—T. W.—E. L.—W. E. L.—W. M. A. W.

WILD BEASTS AND SNAKES.

By MAJOR HOLLAND.

HAS it ever struck you what a very important part these terrible creatures play in this world, considering them only in their relation to mankind? We meet with thousands of worthy steady-going people who are fully persuaded, in their own minds, that not only all things terrestrial, but even the sun itself and all the host of heaven, were evoked and established solely and exclusively for the use, delectation, and gratification of a certain featherless biped of the class *Mammalia*. The serene conceit of this calm assurance amuses us, although the unfathomable selfishness that underlies the notion is apt to provoke us. They have read that at the time of the covenant with Noah, the beasts were placed under the dominion of man, and they maintain that it is wicked to suppose that mere brutes, which were "sent" for man's use, can be of any use whatever to the great Giver of life, and that without them there would be a gap, a want, a disturbance in the balance of the grand κοσμος, in which *Homo* is but one of many constituents.

"To an uncivilized man no proposition appears more self-evident than that our world is the great central object of the Universe. Around it the sun and moon appear alike to revolve, and the stars seem but inconsiderable lights destined to garnish the firmament. From this conception there naturally follow a crowd of superstitions, which occupy a conspicuous place in the belief of every early civilization. Man being the centre of all things, every startling phenomenon has some bearing upon his acts. The eclipse, the comet, the meteor, or the tempest, are all intended for HIM. The whole history of the Universe centres upon HIM, and all the dislocations and perturbations it exhibits are connected with HIS history."

The science of Astronomy has cut away the false foundation of this human egotism, and while unfolding before us a truer conception of the immensity of the Universe, and proving that our world is but an infinitesimal fraction in creation, as undistinguished by its position as by its magnitude, it has forced upon man a truer estimate of his own insignificance; he no longer believes that the planets, like celestial midwives, preside over his birth, that the *Pleiades* are interested in his love affairs, that *Orion*, the armed and belted warrior, is mixed up with the perils of his manhood, and that his own petty individual career is "linked with the march of worlds, the focus towards which the influences of the most sublime of created things continually converge." Having been taught this somewhat depressing lesson of his own littleness, he may next begin to suspect that the other animals which dwell upon the obscure planet *Terra* may, perhaps, be of a little more importance in the eyes of their Maker than he at first imagined, and that He may have given them offices to perform on His own account, altogether apart from the interests and advantages of man, who is not the only one of His creatures for whom He cares.

We well remember an old Scotch "Elder," an austere dogmatic old gentleman, with much faith in the efficacy of mortifying the flesh, or who was at any rate zealous and earnest in recommending self-inflicted discomfort as an infallible spiritual nostrum for others, who while arguing from Genesis c. ix.. vv. 2 and 3, that the antediluvians were all vegetarians, and that animal food was first used after the descent from the ark, became alarmingly "exercised" all of a sudden over the fourth verse.

"Eh dear friends, it's clear that to eat the blood is unlawfu'!! it ne'er struck me, this precious passage afore; eh gude guide us!! but there's nae doot aboot it; eh dear friends, an' me wi sic a relish for black puddins. An' uoo I maun e'en forego the carnal indulgence evermair; for it's just for a' the world as uulawfu' to eat black puddins as to commit fornication."

To our own mind the destruction of human beings to satisfy the hunger of the lower animals presents a subject for deep aud perhaps painful thought. Few of the people who live so peacefully in the blessed security of our sea-girt home have the slightest suspicion of the myriads of their fellow-men who are thus slaughtered every year: they read now aud then of some poor wretch being carried off by a tiger, taken by a shark, trampled to death by a rogue-elephant, or struck by a cobra, and they think it is very sad, and a sort of accident that happens about once in six months in some places abroad, and they feel very glad, or perhaps even thankful, that there are uo such nasty dangerous things in England: let them consider the lesson conveyed by the figures of the following brief but pithy extract from the *Times* of 24th October, 1871:—

"The Viceroy has decided to continue and extend the rewards for the destruction of wild beasts and snakes. The following dreadful records of deaths from both causes during the three years ending 1869 were published in the Government *Gazette* last week:—Killed by wild beasts—Madras, 888; Bombay (exclusive of Scinde, &c.), 148; Bengal, 6,741; North-Western Provinces, 2,168; Punjab, 310; Oude, 569; Central Provinces, 1,347; Coorg, 147; Hyderabad, 129; British Burmah, 107: total, 12,554. Killed by snakes—Madras, 760; Bombay (exclusive of Scinde, &c.), 588; Bengal, 14,787; North-Western Provinces, 2,474; Punjab, 1,064; Oude, 3,782; Central Provinces, 1,961; Coorg, not given; Hyderabad, 226; British Burmah, 22: total, 25,664."

The beasts of the field "sent for *our* use" forsooth! why these fearful records might almost lead us to think that we have been sent for *theirs*. 38,218 human beings have been killed outright, 12,554 by beasts, and more than twice as many more (25,564) by snakes, within the short space of three years; aud these are but the deaths "officially reported";—how many thousands of other deaths have taken place from the same causes, in the districts from which no returns have been rendered, and how many more in lonely isolated villages, in dreary swamps and wild jungles, from whence official reports cannot be obtained. Thirty-eight thousand victims make up a tolerable three-seasons' "bag" for a moiety of one single continent; not for all India let it be remembered, but only for the British provinces thereof. Great as our Eastern empire seems to be when compared with the scanty area and numerically insignificant population of these little British isles, yet our Indian territories are but a part of India, and India itself covers but a fraction of that area of the earth's surface which swarms with "the great *carnivora*" and deadly serpents.

Let some ingenuous youth fresh from his text-books tell us how many times British India will "go" into the 1,309,200 square miles which, according to the trigonometrical survey, are contained in India proper; then let him try how many times even India proper will go into all the rest of the world from which man-killing beasts aud snakes have not yet been eliminated, and however much we may have been startled by the disclosures made by the simple arithmetic of *the Government Gazette*, yet we shall see that we must multiply its tremendous triennial total by at least 7, if we wish to arrive at anything like an approximate estimate of the annual quota of men, women, aud children taken all unprepared, and killed and eaten, torn aud maugled, mauled, crushed, and poisoned for this hyper-devilish *Todtschlagschmaus*.* If Moloch reigned, the inexorable requisitions for bloody human sacrifices could scarce be heavier.

Talk about the horrors of war! and the widows and orphans of our soldiers slain through the ambition of Napoleon! why the sum total of the butcher's-bill for British warriors actually killed in action in all the chief battles of the Peninsular war, including Vimeira, Talavera, Busaco, Barrosa, Badajoz, Salamanca, Vittoria, the Pyrences, St. Jean de Luz, Nive, Orthes, Tarbes, and Toulouse, with Quatrebras and Waterloo thrown into the bargain, only amounted to 6,000. Talavera is mentioned as a bloody battle; it only counts for 800, *i.e.* for 88 fewer than the beasts of Madras have settled with tooth and nail. Waterloo stands good for 93 officers and 1,916 men, in all 2,009; a roundish number, and one which, according to Byron, so shocked the clerical staff of the Recording Angel, that when they came to it,

> "They threw their pens down in divine disgust,
> The page was so besmeared with blood and dust,"—

a proceeding which does uot appear however to have proved "a caution to snakes"; for it is shown by the return before us that in the three years to which it refers, they did more execution amongst British subjects than twelve Waterloos.

Solferino and Magenta, Konigratz and Sadowa, Gravelotte aud Sedan, sink into insignificance; we must turn to Winfield and Cannæ, or the battles of Israel, if we want to find the actual "killed" on one side at all respectable, when compared with the "casualties" caused by the campaigns of the wild beasts and snakes in the vice-regal domains of

* *Manslayer's-feast.*

Lord Mayo. Our friends whose dealings with creatures *feræ naturæ* have been chiefly conducted within the palings of the Zoological Gardens, Regent's Park, can hardly realize the joy with which the dwellers in less-favoured lands will welcome the day when "the lion shall eat straw like the ox, and the sucking child shall play on the hole of the asp," and how, pending its somewhat tardy arrival, they will bless the noble Viceroy for trying to keep them in check a little.

Dear readers, should you ever chance to wander far away from the safe and comfortable realms of Cockaigne, into some of the wild waste places of the earth, you may chance to see strange and painful sights, that will make you put on your considering cap, however little you may be given to thinking. Your true and trusty friend and comrade sickens on the voyage within the tropics, and with his enfeebled hand clasped in yours, he passes quietly into eternity while trying to breathe into your attentive ear some sacred message to the loved ones far away: at sunset the ship's bell tolls, and a sorrowful company gathers round the sewed-up hammock stretched upon a grating in the gangway and covered with the Union-jack; glance your eyes over the still deep blue surface of the summer sea, and behold the ripples cut in it by the tall back fins of several very fine specimens of a certain genus of Plagiostomous fishes, who know the meaning of that booming bell as well as you do, and, obedient to its summons, have quitted their wonted station some ten feet below the surface and fifty yards astern of the vessel, where they have watched and chased day and night for nearly a week, and now come sailing gaily to and fro *à fleur d'eau*, well abreast of the gangway, in the sure and certain hope of a joyful supper.

Go to the swampy jungles, the river-villages, and wood-embowered lagoons of Borneo, and watch the loathsome pot-bellied alligators lying in ambush, with their wicked cat-like eyes on the look-out for venturesome Malays and incautious Dyaks, whom they will snap up without respect of persons, just as young hounds chop leverets.

We once beheld a learned and Reverend gentleman—an M.A., Cantab, great in the schools, and powerful in the pulpit, dashing madly over the lea, with eyeballs starting from their sockets and dishevelled locks streaming wildly in the wind, running for the dear life from a veritable "old serpent,"—no mythical sermon-book bogie,—but a real right down rock-snake about nineteen feet long, ravenously hungry, and determined to breakfast upon the terrified parson, whom he would most certainly have swallowed, holy orders and all, without the slightest compunction, had not an "arm of the flesh" intervened in the very nick of time.

Should it ever be your misfortune to see a man (not "a mere nigger, only one remove from an ourang-outang," but) an educated chivalrous high-minded Christian gentleman, your friend and equal, pulled down by a fierce brute so mad with famine that, regardless of your approach and the shouts of the hunters, it proceeds to devour him before your very eyes, bolting great masses of the quivering flesh and turning it into tiger before "the reasonable soul" is fairly out of it, a dreadful sense of humiliation (perhaps not altogether unspiced with indignation) will steal over you; and though you may have the luck to slay the slayer, and rescue some mangled remains of him who five minutes before enjoyed the pride and strength of intelligent manhood, still a bewildering horror will chill the triumph of your vengeance, and while shuddering over the bloody wreck of the Divine likeness slaughtered to stay the craving stomach of a famished beast, you may perhaps remember and repeat—as one whom we know once remembered and repeated—the words "In the image of God created He HIM," and you will be furnished with something to wonder over and think about for the rest of your days,—ay, even though you may never have wondered or thought about anything before, in all your life.

Bury Cross, Gosport.

THE OTHER SIDE OF THE VIVARIUM.

NO one would rejoice more heartily than the writer, at any contrivances which could be resorted to which promised to facilitate the study of entomology, and render it more popular than it is at present. But I cannot look with any hopefulness upon the suggestions as to the establishment of Insect Vivaria upon an extended scale. I am convinced, not merely by consideration of the peculiarities of the habits of insects of the different orders, but by the results of actual experiment, made, it is to be acknowledged, on a small scale, yet with careful watching as to the results, that though the proceedings of many species can be watched with advantage while they are kept in cages of a kind adapted to their nature, the mixing up of a number of different kinds in any common receptacle will prove more or less a failure.

Some will at once exclaim with surprise, "Why should any difficulties attend the establishment of insect vivaria, when the aqua-vivarium, marine and fresh, has proved so highly successful?" And others will add, appealing to seeming experience, "Have these not been tried, and found to answer very well on a small scale, and would they not do so also on a more extended one?" Now, on the first point it must be noted, that however diverse may bet he contents of your artificial pond or receptacle, though it includes amongst its inhabitants not only insects, but animals belonging to other classes, they all live in the same fluid, and to a very great extent what is conducive to the health of one species, in the

matter of temperature, aëration of water, the presence of vegetable growths, and so forth, is suited to the health of the remainder. But insects, non-aquatic, require a very great variety of conditions to insure their well-being and growth to maturity. It is not impossible to carry out these conditions with the exercise of caution and patience, but separation is almost unavoidable, unless you are taking species in those stages when they are quiescent, or nearly so, as in the egg and pupa states, which are not likely to be particularly attractive in the vivarium—at least in most species. The larvæ of insects require treatment of the most diverse kind; and this is true even of some species which have very close affinities.

So, too, is it more or less the case with insects in the imago state: if we wish to see them to advantage as prisoners, we must give them an abode which will afford them all facilities for pursuing the course of their existence as they would if at large. With many insects it is impossible to manage this, unless we give to a species a separate abode; and with probably the majority, in most cases, no contrivances can make them fully at ease when they are removed from their natural habitats. For it happens very unfortunately that the species which we think most fitted to adorn an insect vivarium will not take at all kindly to it; a notable example being furnished by the Diurnal Lepidoptera; and only a few of the night-flyers in that order can be introduced in the imago state into the vivarium.

In the frontispiece to a work upon the subject, the artist depicts a scene, over which I have enjoyed many a laugh with friends. The elegant structure contains both land and water, the latter, however, appearing to preponderate almost as much as it does upon the surface of the globe—an arrangement certainly not desirable in actual practice; but the artist may be conceded some liberties.

Passing over the dwellers beneath the mimic flood, when we proceed to examine into the habitants above, we find a very amusing commingling of species. There are several larvæ, one or two of which are recognizable as the spiny larvæ of one of the Vanessas; there is also a hairy individual supposed to be a Tiger, and a caterpillar of some Hawk-moth, presumably that of the Privet Hawk (*Sphinx ligustri*).

Careering about in the vacant space above, we have the moth of the last-named species, and if we are startled to find it in all its winged glory, while the caterpillar producing the same species is also feeding within, we must set the circumstance down to the remarkable influence of the vivarium, which may be supposed to have prolonged the life of the moth beyond its wonted limit. Various butterflies are recreating themselves, the Large White, the Clouded Yellow, and the Purple Emperor being prominent, the last of these being represented in such a position, just above the water, that one would suppose, like Venus, he had just emerged from it.

Now with regard to the demeanour of the Privet Hawk-moth in such circumstances I can speak positively, having kept a number in a good-sized vivarium, made by way of experiment at a time when I was desirous of obtaining eggs of the species. Throughout the day they are placid enough, but towards evening there was a mighty commotion; they dashed to and fro on their strong pinions, heedless of opposing glass and zinc; the result being seen in the morning in fractured antennæ and wings soiled and frayed.

Allowing for difference of habit, a nearly corresponding result ensues with the butterflies. A few species indeed are sluggish, and take but short flights, such as the Greasy Fritillary; the majority speed rapidly on the wing, while some rise upwards with considerable force. All these will, as a rule, remain inactive enough while the vivarium is in the shade; but when the sun is allowed to shine upon it, then begin their rapid gyrations. Like our well-known house-fly, they sweep towards the glass, mistaking it for empty space through which they can pass. We have all seen flies strike themselves repeatedly against window-panes, and retire seemingly none the worse; it is not so with butterflies, whose plumed wings are by no means improved by such muscular feats.

I have enclosed flowers with these insects in a vivarium, but they have hardly ever deigned to alight upon, or take any notice of them. In the same engraving to which reference has just been made, there are also introduced some specimens of the Neuropterous order, including dragon-flies of the larger species. It is a matter of familiar observation to every one, that these insects take long flights, hawking to and fro after their prey. They therefore brook confinement exceedingly ill, and, in fact, if the owner of the Insect Vivarium has well supplied his menagerie with curious examples, he will have reason to rejoice if his dragon-flies are inactive, for when hunting they can destroy a good number of insects in a very short space of time. A vivarium would need to be large indeed to allow sufficient scope for the evolutions of the majority of winged insects.

Then again, as to the uses of vivaria in the matter of larva-rearing, the keeping of a number of different species in a general cage almost precludes that proper attention to the wants and habits of each, which is so necessary for their successful culture. And a most serious disadvantage is this, that insects of all the orders display an inclination, constantly or occasionally, to make other insects their prey; nor will the best supply of food, and frequent watching, obviate this. Especially will this happen if we have introduced a pond in our

vivarium, and stocked it with insect inhabitants of the usual kinds. These will be likely enough to make predatory excursions amongst the dwellers upon the land, and the latter have, unfortunately, no opportunity for returning these attacks; for though some of them are pretty sure to make acquaintance with the "liquid element," they have quite enough to do to extricate themselves therefrom. And this is one of the drawbacks attendant upon the addition of water, that the non-aquatic insects will persist in tumbling into it, and the friendly observer, who acts the part of the Royal Humane Society, cannot be always at hand.

He who has done anything in the way of rearing insects through their various transformations, cannot but admit that a very great preponderance of larvæ prefer to conceal their proceedings. Many of the burrowing and mining larvæ are, from the very nature of their food and their peculiar habits, of necessity hidden from view; nor could they well be made objects of exhibition in any vivarium which could be contrived. And with regard to the caterpillars or larvæ of Lepidoptera (butterflies and moths), to which some persons would point as good examples of the fitting tenants of the Insect Vivarium,—these, though feeding often in positions where they can be observed, are easily frightened from their food. Sounds, agitation, or even the mere approach of an on-looker, will cause at least three-fourths of our caterpillars either to assume some posture of defence, or at least to swing from their food-plants by silken cords. So much is it the fact that caterpillars are not likely to get on well if they are liable to disturbance, that some years ago, when I had a number in rearing, belonging to different species, in a small ant-house, I found it necessary to make an absolute rule that visitors, especially juveniles, should have very infrequent admission. This would apply just as much to any vivarium which, while so contrived as to embrace within it a variety of larvæ as well as of imagos, is intended for public exhibition. However much we may regret it, it is nevertheless true, that many of the most interesting amongst the insects cannot be watched without much caution and patience, so anxious are they to conceal their proceedings from public view. A notable instance suggests itself in the economy of the bee, and though formicaries may be contrived, in which the proceedings of ants can be observed to an extent, much that goes on is hidden from public gaze. But only fancy an Insect Vivarium of large proportions, erected for the inspection of that very careless animal the British public! We will suppose that its managers stock it with a proportion of rare and choice species; and, for their benefit, it would be needful to have a series of notices in the vicinity, somewhat in the following style:—"Coughing or loud talking is strictly prohibited near the Vivarium." "Visitors are requested to tread lightly when they are approaching the Vivarium." "Though persons are not forbidden to point at objects in the Vivarium, it is requested that no one will touch or tap against the glass or metal work." "Those who are habitual smokers, or who have any strong odour about their person, are cautioned not to continue very long in proximity to the Vivarium."

But, returning to the question, "Do not some Insect Vivaria answer very well?" I must confess to scepticism on the point. I know several who made trial of them, and after a few months of varying success, have had to give up the attempt to make them answer. One of the greatest difficulties I found, was with regard to the plants. The vivarium cannot be kept in the open air, exposed to the changes of the weather; for several reasons it is needful that it should be screened from these, though, in the ordinary way, it may be desirable to expose the vivarium, if not in sunshine, at least to full daylight. A supply of grass is exceedingly desirable, as observed by a correspondent of SCIENCE-GOSSIP, and this will not grow to advantage under cover. Nor is the case exceptional, for a series of troublesome experiments with different plants, which were required for the purpose of feeding larvæ enclosed in the vivarium, proved to me that our native plants, on the whole, will thrive for but a brief space if placed within a structure, which places them under conditions corresponding to a conservatory life. And another awkward circumstance is this: that if you actually feed larvæ upon the plants you have growing in the earth of your vivarium, these soon become disfigured, and the appearance they present is unpleasing to the eye. Hence the expedient has been suggested, of introducing here and there bottles filled with water, into which the twigs or branches of shrubs and stalks of low-growing species are inserted, and renewed from time to time. The proper adjustment of these amongst the other plants is an awkward business, and the requisite changing of them quite as much so, especially if the vivarium is well stocked with flying insects as well as larvæ. Many of the latter must of course be removed with the food-plants and put back again. Another annoyance I may mention here, attendant upon larvæ-receiving in the promiscuous style and it is this—some species require special food, not easy to obtain in the right condition. You furnish them with a supply of this in your vivarium, and visiting it some morning, you find, to your great disgust, that it has been devoured by some "common fellows," who might have satisfied themselves with the plants on which you had placed them, but chose to wander off, and attack a neighbour's feed.

Experientia docet. The inference I have drawn, from personal experiment and the reports of others, is unfavourable to Insect Vivaria, on either a small

or a large scale. I don't believe the habits of insects could be seen in these, so as to furnish an exhibition either interesting or instructive to the public generally; and secondly, in breeding and rearing them, I judge that, from the great differences in economy which we find amongst insects, it is better to isolate each species in some cage or case suited to its particular wants.

If any one wishes to see the subject of Insect Vivaria treated rhapsodically, he had better obtain a work called the "Butterfly Vivaria; or Insect Home." The whole thing seems remarkably easy, and quite poetical (on paper); but it is no disrespect to the author of this book to say that he is much greater as an artist than as an entomologist.

J. R. S. Clifford.

VARIATIONS IN COLOUR OF WILD FLOWERS.

ALLOW me to add a few remarks to those which have lately appeared on this subject. Departures from the ordinary hue are, I think, most frequent, relatively, in blue flowers, less so in red, and very rare in yellow ones; indeed, the common primrose is the only yellow flower of which I remember to have found differently-coloured varieties—viz., red and white. The KidneyVetch (*Anthyllis vulneraria*) rarely occurs with scarlet flowers, and the yellow-flowered *Trifolium Molinerii* is said to be the parent stock of the crimson *T. incarnatum*, a field of which forms such a glorious contrast to the prevailing green of a summer landscape. Of flowers normally blue, the changes are to white and pinkish red; yellow never being seen. White varieties are more common than pink ones, both as regards individuals and species; many blue flowers, as the species of Veronica (Speedwell), occurring sometimes white, but never pink; whereas I cannot remember one that ever comes pink and not white. Flowers that occur of these three colours are normally of a deep purple-blue—*e.g.*, the Sweet Violet, the Blue-bell (*Hyacinthus nonscriptus*), the Milkwort (*Polygala vulgaris*), the Bugle (*Ajuga reptans*), and *Prunella vulgaris:* the red varieties of these are merely a dull, washed-out pink or purplish red, and I cannot help thinking it probable that, in the formation of these varieties no new colour is present, but only the blue colouring matter deficient, the red which enters into the composition of the natural purple alone remaining, while in the white variety both blue and red are wanting. Of the Violet and Blue-bell, I often find a fourth shade, a delicate pale lavender, intermediate between the purple and white forms: minor differences are very common. Of the Boraginæ, a large proportion bear bright blue flowers, but I have never found one which varies from blue when fully out, though almost all of them are red on first opening, and become blue as they expand. The Comfrey (*Symphytum officinale*), however, usually reddish or white, is occasionally of a dusky purplish hue, hardly to be dignified by the name of blue. White varieties of red flowers are not rare; *e.g.*, *Geranium molle*, *dissectum*, and *Robertianum* (all of which I have found white this summer), also several species of Orchis and *Epilobium angustifolium*; but the Pimpernel (*Anagallis arvensis*) is the only red flower, that I am aware of, that ever comes blue; and in this variety there are other differences sufficient to have induced some botanists to erect *Anagallis cærulea* into a species. I have lately found the common Poppy (*P. Rhœas*) with pale lilac petals. White flowers rarely occur wholly of a different colour, though often shaded on the outside like the rays of the daisy and the sepals of the wood anemone, and, in fading, they sometimes become pink, as the last-named plant, and the May (*Cratægus oxyacantha*). I do not think that shade has the effect of producing white varieties, though it renders the natural colour less vivid; nor have I noticed any effect of soil in causing variations of colour. Almost all the soils here are calcareous, but some woods near here on the green sand are completely clothed in April and May with a purple carpet of blue-bells, and among them white flowers are not uncommon. Sometimes the deficiency of colour in the petals is shared by the rest of the plant,—a true case of albinism; this I have noticed in *Linaria cymbalaria*. On the other hand, the foliage of the white-flowered plants of *Geranium Robertianum* that I know is particularly dark red, they growing on an exposed wall top. In this neighbourhood, as noticed also by Mr. Macmillan at Castle Cary, 16 miles distant, the white variety of the scented violet greatly preponderates. I have estimated the proportions of the different colours as 70 per cent. white, 20 per cent. blue, and 10 per cent. pink. It is strange that white varieties of *Viola hirta* and *sylvatica* do not occur. In the preceding remarks I have, of course, only spoken of the varieties occurring in the wild state; under the much greater diversity of conditions which man can produce, greater variations occur.

Beckington, Somerset. H. F. Parsons, M.D.

Robber Ants.—It is believed in Brazil that the young of the Cupim or Termite are carried off and enslaved, like West Africans, by the fierce Plantation ant (*Atta cephalotes* or *Sauba*), which thus represents the wicked and merciless white man. But the same tale is told of the Quemquem ant, and possibly the superstition may have arisen from the different sizes of the workers major and the workers minor.—*Burton, Highlands of the Brazils.*

THE STORY OF THE "CRAGS."

By J. E. Taylor, F.G.S., &c.

IT may be that some of the friends who are good enough to listen to what we have to say, do not understand what is meant by the term "Crag." Some of our fellow story-tellers have already remarked that many of the terms used in geology have been borrowed from vulgar use, and elevated into scientific expressions. It is necessary to understand the latter before much progress can be made. This, however, is not the place for explaining any other than our own. "Crag," then, is a word common in the Eastern counties, especially in Norfolk and Suffolk, and is applied to those thick beds of marine shells whose history we purpose relating. Ask any person living near the localities where these strata crop out, and they tell you, in a dialect you will find it difficult to understand, to what the word is applied.

Geologically, the "Crag" beds belong to that period of time known as the *Pliocene*. They are deeply interesting, on account of their connecting the past with the present. They also give you a good idea of the physical and climatal conditions of this country just before the extreme and lasting cold of the Glacial epoch set in, and testify to general circumstances not greatly unlike those which now prevail in these latitudes. We "Crags" are three in number, of which the oldest is that known as the *Coralline*. Then comes the *Red*, and lastly, the *Norwich*. The former goes also by the name of Older Pliocene.

We must take you back to a period—that of our birth—when the climate was rather warmer and milder than it now is. A good portion of Suffolk was then lying under a tolerably deep sea, along whose floor beds of shells were forming. The genial temperature of the water was favourable to the development of animal life. Hosts of beautiful echinites (*Temnéchinus*) slowly pulled themselves over the smooth bottom. These creatures subsequently became extinct in English areas, and naturalists believed they had passed out of existence altogether. We hear, however, they have been met with quite recently whilst dredging in deepish water off the coasts of Florida, on the other side the Atlantic. You may guess, therefore, the time which has passed away since the Coralline Crag was formed, by the agencies which have slowly driven a once English inhabitant to take up its isolated abode in American waters. The mollusca literally swarmed over the Suffolk area, and it is out of their broken and disunited shells that we "Crag" beds have been formed. Chief among the generic forms were the *Astartes*, whose specific abundance was only excelled by their individual powers of multiplication. Next came the *Pectunculus*, whose members literally swarmed. The *Cyprina* was not absent, and its beautiful valves are among the chief spoils to be obtained at Orford, in Suffolk. One genus, *Cardita*, is also largely represented, and you may frequently disinter it with both valves still united. No fewer than three hundred and fifty species of mollusca lived in the waters of the Coralline Crag sea; and in the beautiful cream-coloured deposits you may pick these out with as much ease as you would the empty valves on some sea-beach. To those who are fond of conchology, and who love still more to read off the simple but profound lessons which fossil shells teach, we would recommend a visit to those parts of Suffolk where we lie in original repose. It is like walking over the dried-up bed of a recently-existing sea, and obtaining those secrets which the dredge and other instruments can so imperfectly explain in these days. Besides the great number of species of mollusca found here, and in addition to the Echinodermata, or "sea-urchins," there are no fewer than one hundred and thirty species of *Bryozoa*, or "sea-mats," which have been discovered. Some of them, such as *Fascicularia*, are quite unlike anything now existing, although they lived in what were then British waters, at a period geologically so recent. Corals, all of them belonging to the solitary kinds, are also plentiful, and their beautiful shapes are only excelled by the ornate sculpturing of the "sea-urchins." Altogether, therefore, you may form some idea of the rich treat for the naturalist which is to be obtained simply by "collecting" in our beds; whilst, if your philosophy goes deeper, you will not be long before you come to some such conclusions as the following, all of which form a veritable portion of our life-history.

The sea of the Coralline Crag was subject to occasional extremes. On its floor were met species of shell-fish which are now regarded as indicating wide differences of climature. The Astartes decidedly point to northern conditions; but such forms as *Pyrula*, *Voluta*, and *Cassidaria*, as distinctly point to warm waters. We can hardly speak positively on this point, but we think these extremes may have been produced by alternate currents of warm and cold water, which, as we have heard, are found to exist in the deeper parts of temperate seas at the present time. Whether or not, it is certain that such circumstances would only make the life-forms more various and the species more abundant. The total number of shells which you may call "southern," met with in this the oldest Crag, is twenty-eight—not a large number, you will say, out of the total. But, small as this number is, it will assist us in explaining to you the gradual change of the physical conditions which occurred during the Pliocene epoch. Some of them were driven away from these latitudes by the encroaching cold,

and step by step migrated southerly. One species, doubtless the lineal descendant of those which lived over what is now called Suffolk, is met with in the West Indian seas. Most of the "southerly" shells, however, are to be found in the Mediterranean.

By the slow accumulation of dead shells, corals, &c., cemented by the smaller tests of foraminifera, the Coralline Crag eventually attained a thickness of fifty feet. It was slowly upheaved, and subjected to great erosion by the action of marine currents which scooped out great hollows. When the upward movement was arrested for a time, in these hollows was thrown down another and later series of deposits, termed the "Red Crag." This Crag, whose prevailing colour gives to it its name, has a much wider extension than the older member of our series. Just before it was formed, the same wear-and-tear which had so effectually cut down the Coralline Crag also denuded the underlying London Clay. For ages before the depression took place which brought the Crag seas over Suffolk, this had been a land surface, over which had roamed hosts of wild and extinct animals. The wear-and-tear had loosened and washed out the fossils of the London Clay, so that underneath the Red Crag, and with the latter resting on it, you find a bed of stones in which are huge teeth of sharks, bones of whales, teeth of tapir, elephant, mastodon, &c. The stones are those so-called "coprolites" which make the Red Crag so valuable. These are nothing more or less than phosphatic nodules in a re-deposited state.

In this Red Crag sea there lived over two hundred and fifty species of shell-fish, among which, however, you will only find about thirteen of the "Southern" forms. The "Northern" types are also on the increase, so that you have in these two facts an indication of an increased rigour of climate. The sea was not so deep as during the formation of the older crag, so that you get a great many more shallow-water shells, among which those of the Limpet family are most abundant. The small single corals were very numerous in places, and the little cowrie-shells literally swarmed everywhere. That the water was shallow you may see for yourself whenever you visit a Red Crag pit, for you cannot fail to be struck by the lines of false current bedding which everywhere meet your eye. The rough marine action testified to by these phenomena ground up the more delicate shells into the bran-like appearance of which the matrix of the crag is composed.

Extending in a north-easterly direction, towards the conclusion of the Red Crag era, and when its beds had been formed to a depth of at least twenty feet, was a shallow estuary, which ran sinuously through the bare chalk into what is now Norfolk. It occupied the very site of the city of Norwich, and reached its head about four miles beyond, where a small river poured its waters into it, so as to produce brackish water conditions. You will see, therefore, that this later, or "Norwich Crag," as it is usually called, was merely a fluvio-marine extension of the more purely marine Red Crag. Owing to its being formed under different conditions, the fossils of the Norwich Crag differ very much from those of its older brethren. You meet with no corals or other shells which indicate tolerably deep water. Instead you have abundance of periwinkles, cockles, mussels, whelks, purple shells, &c., associated with myriads of *Tellina* and *Mactra*, as well as winkle-traps and *Cerithium*. Associated with these are brackish-water shells, and such purely fresh-water mollusca as *Lymnea*, *Planorbis*, &c., and even land-snails, which had been brought down by the tributary streams, and eventually strewn along the bottom of the estuary where the Norwich Crag was slowly forming. Altogether, no fewer than one hundred and twenty species of mollusca have been derived from this bed. Underneath it you may see a similar stone bed to that underlying the Red Crag in Suffolk, and, like it, testifying to its having been an old land-surface of the solid chalk; for here are abundant remains of deer, elephant, rhinoceros, mastodon, &c.

Such are the relative geological conditions of us three Crags. After the formation of the latter, a depression ensued, which brought the sea over what had previously been merely an estuary, and along its floor was formed another bed of crag, in which marine shells only have been met with. At Aldeby, on the borders of Suffolk, you may see the shells of this bed occupying their original position, the *Myas*, for example, being found erect in the sand. Neither in the old Norwich Crag, nor in this later bed, do you come across any "southern" shells; whilst it is evident that the percentage of "northern" species was proportionately increasing. This is good evidence of the fast-encroaching cold,—a cold which shortly afterwards set in, as the drift-beds overlying these crags, and into which the uppermost beds silently pass, plainly attest. The Upper Crag, indeed, is a sort of bracket between the Pliocene and the Pleistocene, or "Glacial" series.

It is interesting to note, as you analyze the shells of the crags we have mentioned, how the percentages of recent or living shells to those which are extinct bears out their relative ages. Thus you find less than ten per cent. of *extinct* shells in the Upper Crag just named. In the Norwich beds there are eighteen per cent., in the Red Crag twenty-five, and in the Coralline Crag thirty-one. How long it is since the Norwich Crag was formed, you may gather by the fact that some of its representative shells are now living only in certain parts of the Pacific!

There are beds of the same age as the Coralline

Crag in Belgium, but these are often hardened into stone. They may, and perhaps are, somewhat older than those we have been attempting to describe, and may be regarded as connecting the Miocene with the Pliocene period, just as the last-mentioned crag-bed connects the latter epoch with the Glacial. We have ample proofs that this Belgian bed extended across the German Ocean into Suffolk, where it was broken up, and the fragments, rolled and angular, are often found in abundance at the base of the Red Crag, and known by the local name of "Box-stones."

In Sicily beds of Pliocene age abound, and have been uplifted to 3,000 feet above the sea-level since the time when the Norfolk and Suffolk beds were formed. Many of the shells spoken of, which migrated from English latitudes during the later Pliocene, and when the cold was increasing, took up their habitats in Sicilian seas, and are now found fossilized in the limestones. Since then their descendants have returned to their original English home, and, as the oyster and mussel, administer to modern English appetites. The oldest of these Sicilian beds, perhaps contemporaneous with the Coralline Crag, was strewn over an area that was subject to volcanic shocks. Occasionally volcanic ashes were intercalated with the shell marl. At length, by the simple accumulation of volcanic ashes and lava, during a slow elevation as well, a great mountain 11,000 feet in height was formed! That mountain was *Etna*, and the Pliocene shell-beds at the height of 1,200 feet along its flanks indicate its recent origin. In Italy, just above Florence, there was a great fresh-water lake, into which the rivers occasionally carried carcasses of mastodons, elephants, &c. The deposits which formed along its bottom accumulated to 250 feet in thickness. All over the Northern hemisphere great zoological as well as physical changes occurred during the period of the "Crags." Animal life slowly prepared for that great event which wrapped Europe in glacial ice for tens of thousands of years. All these facts may be more or less accurately and minutely read off in the sometimes loose and unconsolidated strata of the Pliocene age, of which we Crag-beds are the English representatives.

ANTS AND THEIR SLAVES.

THERE are two species of ants which are accustomed to make predatory incursions for the purpose of carrying off the larvæ and pupæ of their black brethren,—*Polyergus rufescens* and *Formica sanguinea*. As neither of these ants are natives of Britain, we have not the opportunity of watching their habits for ourselves; and, under these circumstances, I venture to think that a short account of their expeditions will not be uninteresting to the readers of SCIENCE-GOSSIP. The predatory ants do not leave their nests for these incursions till the male insects are nearly ready to emerge, and then they send out scouts, who run over the adjacent fields in search of a nest of negro-ants; or if these are not to be found, they look out for some other species, such as the miners (*F. cunicularia*), though these latter are very courageous. Huber says of them: "These ants will fight with the most obstinate courage, scarcely yielding an inch. In fact, as soon as their assailants are in sight, myriads of miners rush upon them with great fury, and the nest becomes the scene of a terrific conflict; and though the red ants are larger in size, and usually number more than the miners, they are often beaten off by the latter." But to return. When the scouts come back to the nest, active preparation is made for the impending expedition, and the warriors who are destined to take part in it are selected. The ants now get so excited that they butt at each other with great violence, and let out their exuberant spirits by cleaning their legs and antennæ, and by general and ceaseless activity. On the following day, about four o'clock, the chosen band sallies forth, being preceded by an advanced guard of a dozen ants, who march before the main body for about a yard, and then wheel round and take their place at the rear, their former position being occupied by the front rank of the main body, who fall back in their turn, and are replaced as before. Thus they march until they approach the negro camp, when they separate, each ant pursuing a devious course through the grass, and coming suddenly on the formicary, which is frequently left unguarded. In general, the black ants make no attempt to defend their progeny, but beat a precipitate retreat from one side of the nest as the plunderers enter the other. Occasionally, however, a fight takes place, in which the negroes are invariably vanquished, being placed at a disadvantage and terror-stricken by the sudden nature of the attack. After the battle the pupæ are transported to the nest of their captors, where, however, they suffer no diminution of happiness, being brought up and employed in the same way as they would have been in their own home. The motive which induces the rufescent ants to make these excursions is their excessive indolence. The negro slaves do all the work, even feeding and carrying about their masters, and not unfrequently obtain such an ascendancy over them as to reverse their respective positions. For instance, they will not allow them to go out on their expeditions before the proper time; and if they return without their usual booty, the negroes show their displeasure by attacking them and preventing their entry into the nest. Kirby and Spence, in their "Entomology," say that the rufescent ants, in addition to the pupæ, carry off prisoners, whom they ultimately devour. But this is doubtful.

Blackheath. E. C. LEFROY.

PRIZES FOR COMPETITION IN BOTANY, MICROSCOPY, AND GEOLOGY.

BY the kindness of several distinguished friends of the Saturday half-holiday in London, the sum of thirty guineas is proposed to be offered for competition to London field-naturalists and microscopists, for the encouragment of Saturday afternoon field excursions for botanical, geological, and microscopical purposes.

Her Grace the Duchess of Sutherland, the Countess of Ducie, and the Most Noble the Marquis of Westminster, believing that the proposal would tend to popularize pleasant and instructive recreation on the Saturday afternoon, and commend the Saturday half-holiday in departments of business where this weekly boon is greatly needed, have kindly intrusted the Committee of the Early-closing Association with a fund for this purpose.

The following are the prizes and the subjects proposed for competition:—

1. *The Duchess of Sutherland's Prize of Ten Guineas, for Botanists.*—£5. 5s. for the best collection of mosses, including the *Hepaticæ*, obtained within twenty miles of London; £3. 3s. for the second best collection; £2. 2s. for the third best collection.

2. *The Countess of Ducie's Prize of Ten Guineas, for Microscopists.*—£5. 5s. for the best list of the ponds and other aquatic resorts within fifteen miles of London, and the *Microzoa* found in them, in the twelve months between 1871, and 1872, giving the locality of pond, the date of the visit, and the state of the weather at the time; £3. 3s. for the second best collection; £2. 2s. for the third best collection.

3. *The Marquis of Westminster's Prize of Ten Guineas, for Geologists.*—£5. 5s. for the best list of open geological sections and exposures of the strata of the London district, giving the fossil species found at each section (in the order of their abundance) and the characteristic species of each formation exposed. (Note.—As the object is to obtain information for the purpose of field-excursions, the sections given must be such as are now open, and likely to continue open for several years; *e.g.*, chalk-pits, gravel-pits, sand-pits, clay-pits, and similar excavations. The natural exposures given should also be accessible for at least the next few years. £5. 5s. for the best notes on the connection of the landscape scenery of the London district with its geology.

The papers on Geology and Microscopy (subjects 2 and 3) must not in any instance exceed in length two columns of *The Times* newspaper Parliamentary debates.

Professional collectors and dealers are excluded from the competition. The prizes are intended exclusively for those with whom Natural History pursuits are solely the recreation of their leisure after-business hours.

HENRY WALKER, *Secretary.*

Early-Closing Association,
100, *Fleet Street, E.C.*

CHANTING MICE.

FOR some time past I have had a mouse about my aviary making a very queer noise, about as loud as the steam of a roasting apple, but somewhat resembling the song of the canary; that is, that part of the song where the canary imitates the titlark.

I have been told the noise which the mouse makes is caused through a diseased liver. Such is not the case with the little animal in my possession,* for when most comfortable he sings almost without ceasing. When first taken he was uncommonly tame, fed well, cleaned himself, and seemed as happy as though he had been there all his lifetime, and this peculiar tameness was exhibited whilst in the mousetrap; but after being in the trap some hours he began to get cold, and then he discontinued his song. A cage having been procured, the chorister was transferred to warm quarters and treated to some sop-bread and milk; he was again in full song, thereby proving that it is not disease which causes him to make his peculiar noise. The editor of "Routledge's Natural History" mentions mice imitating the song of several different birds; so, upon the strength of his remarks, I have hung mine near a woodlark-linnet.

Some years ago I had a mouse in my pigeon-room that nearly always made his appearance as soon as the birds were fed; there was he, tail cocked up, and looking like a miniature stuffed pig. After a little time I discovered his fur began to disappear, until the poor thing looked at last for all the world like a parchment mouse. I came to the conclusion that he was an outcast, and that the rest of the mice stripped him; and the only chance he had of getting food was at the time I fed my pigeons.

About seventeen years ago an intelligent and highly respectable person told me of a common brown house mouse that used to appear daily and climb upon the table whilst the servant was at breakfast. After the little creature had taken his repast, he would descend, disappear behind the dresser, and then commence its song. One morning a mouse was found caught in a trap, and from the knowledge they had of the tame mouse, which they thought had a longer head than usual, their fears were aroused; and not without cause, for the odd mouse was seen no more.

CHAS. J. W. RUDD.

* A trap was set, and the songster soon caught.

THE ORANGE PEZIZA.

THE following account of the fructification of a fungus may, I think, prove interesting to some of the readers of SCIENCE-GOSSIP, if they are as unacquainted with the process as I was myself; but I must, from the commencement, start with the proviso that the language need not be scientific, for I have never made fungi a study; the circumstances even which led me to examine the specimen now under consideration being for the most part accidental.

Taking a country walk a few days ago, I was struck by noticing a large number of an orange-coloured fungus growing between the stones of a newly-made macadamized road, some small, others reaching to about two inches across, the colour usually being as near that of a carrot as possible, the shape, when full-grown, something like a human ear.



Fig. 157. *Peziza aurantia*, nat. size.

I collected about half a dozen, and having an aquarium with a ledge above the water for ferns, &c., I thought a few would not look unornamental in it. Accordingly, I brought them home, and safely deposited them on the aforesaid ledge of the aquarium, which, by the way, is covered over with two sheets of glass.

The following day they were left undisturbed; but, the day after, I lifted the glass off to look at them, when I was surprised to see the largest suddenly enveloped in what appeared to be a cloud of steam; but it immediately struck me that no doubt it was by some means ejecting its spores, and that the secondary cause of the ejection was the gentle rush of air occasioned by removing the glass. To see if this were the case, I blew upon another, and found that about a second after I had blown it showered out, if I may so say, in all directions, chiefly round the edge, which was probably the ripest part. I did this repeatedly, and found that, after they had been left five minutes or so, the same effect followed *about a second after they had been blown upon;* and what surprised me still more was, that several time the "shower" in issuing forth made a distinct sound, which I cannot better describe than as a slight "fizz." To put the matter beyond doubt, I called another witness, who agreed with me that there was not the slightest doubt about the "shower" or the sound. The question now arises, how is the sound caused?—by the rushing of the — I think I may safely say—millions of spores through the air?—by the friction occasioned by their exit?—or by the prime cause that compels them thus to issue forth?

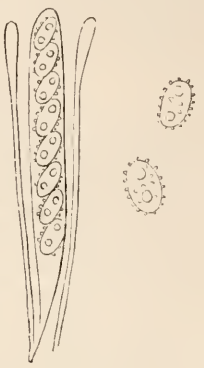


Fig. 158. Ascus and Sporidia × 320.

Before putting them under the microscope there is one other curious fact to notice, and that is, that after dark I could not obtain any "showers." This might be attributed to my not being able to distinguish the spores by gas-light; but this was not the case, for during the day, after blowing, I put a glass slide over them, and obtained countless spores on it. But at night I repeatedly tried the whole of the fungi, and never collected a single spore; nor have I in the morning; the best time for the phenomenon seeming to be the afternoon, I suppose on account of its being the warmest and brightest part of the day; but they do not appear to like either too much heat or too much damp, but a medium quantity. I will not fill up space by narrating how I came to this conclusion.

Having collected a great number of spores on a glass slide, by placing it over the fungus after blowing (the spores being often thrown to the height of an inch or more), I put them under the microscope with a rather powerful object-glass, and found them to consist of minute oval particles, varying in length, as far as I could make out, from $\frac{1}{2000}$ to $\frac{1}{2400}$ of an inch, filled with other minute particles. The formation of each spore was more apparent after they were mounted in Canada balsam and viewed through the polariscope, when each was seen to consist of two distinct granules, united together with, and surrounded by, a transparent covering.

Afterwards I examined a thin section of the fungus itself, and saw that the greater part of the interior was composed of the spores arranged in long tubes, the spores being not exactly end to end but slightly slanting, as would be the case if eggs were placed in a tube somewhat too large for them. These tubes terminated in slight hollow eminences on the surface, through the mouths of which the spores were ejected. What I wished to discover, but could not, although I examined them intently for two hours, was the prime cause of their ejection.

Carpenter tells us that spiral springs act thus in some fungi, but I could not trace the slightest resemblance to a spring; and even were they springs, why should a puff of wind occasion such thousands to act? A. E. DE MORAVIA.

THE FOX-MOTH.

I THINK I can assist your correspondent R. Garfit to a knowledge of the life-history of *Lasiocampa Rubi* (Fox-moth). It abounds on those parts of the Lincolnshire sea-banks where *Hippophae rhamnoides* (Sea Buckthorn) grows. I have visited that coast for thirty years past, and on all occasions have observed the larvæ in profusion. The "natives," as Mr. Garfit terms them, are not an observing people, and as a rule, are unaware of the existence of the insect on their coast. This is in some measure accounted for by the fact that the larvæ, when sufficiently grown to be conspicuous, conceal themselves during the day. I have frequently gathered them in the autumn when nearly full-grown, bringing them inland with a supply of the Sea Buckthorn: on this they would feed for several weeks and then retire for hybernation: the great difficulty is to carry them through the winter. My most successful year was when I put them into a large box without a lid, about half-filled with earth, and over this, moss, leaves, and other débris, to enable them to conceal themselves, covering it with wire netting of sufficiently small mesh to prevent escape. The box was placed in a sheltered place in the garden, where it remained during winter. When the larvæ began to move in the spring, I threw in budding branches of hawthorn, sprigs of heath, &c. Whether they fed at all, I am unable to say; many died during the winter, others in the act of spinning their cocoons; those which succeeded in reaching the perfect state, emerged the end of May and beginning of June: less than twenty per cent. of the brood attained the imago state. Another year I wintered them in a cool potting-house; but on this occasion I was even less successful. The eggs of this moth are deposited in May and June, but the young larvæ are not much seen until about an inch long; they are then velvety black, with a gold-coloured ring round each segment: their appearance varies at each moult (it would occupy too much space to give the detail here). Finally, they are reddish-brown, with yellow and black between each segment: these markings show finely when the larva is in motion,—beneath bluish, and about three inches in length. The larvæ, when young, appear to feed at all hours; but, as I have said, the hearty full-grown ones are hid during the day, coming up to do so at sunset; they are then very conspicuous objects. They retire to their winter quarters on the approach of cold weather, re-appearing for a brief period in spring, then change to the chrysalis state, in which they continue several weeks, the moth emerging about the end of May. Along the Lincolnshire coast, by Crofts, Skegness, Winthorpe, and farther north, the sea-banks are for miles covered with the Sea Buckthorn. This is a grand feeding-ground for the larvæ of *L. Rubi*, and in the June twilight the male moth may be seen wildly coursing about in search of the female. At the time I collected this insect, I was engaged in making pictorial illustrations of the life-history of the Bombycidæ. On referring to the drawings, I find the larva of *Rubi* depicted in its various stages of growth. If this would interest Mr. Garfit, I should be glad to afford him the opportunity of seeing it.

Newark. GEORGE GASCOYNE.

FOX-MOTH (*Bombyx Rubi*) (p. 263).—A correspondent asks for information about the best treatment of these hybernating larvæ. Having reared this species several times—once from the egg—I may be allowed to give my experience, though I by no means wish to inculcate that mine was the *best* manner of treatment. A large box, with a lid made of perforated zinc or wire gauze, a layer of earth, covered with loose rubbish and moss in the bottom, and the whole placed *out of doors*. Take care that the bottom of the box is perforated, so that the moisture may drain off. I placed the larvæ therein with their food—generally heather—in the autumn, and when the cold became severe, the majority of them sought shelter in the moss, &c., provided for them. These larvæ are able to stand very intense cold, often before they hyberuate appearing to be quite frozen, and sometimes they are attacked with a white kind of mould, which causes them to die off rapidly. One season nearly the whole I found thus perished. Though this species hybernates in the larva state, it is usually, if not invariably, full-fed when entering its winter quarters. It comes out again in March (but, as far as I could observe, never feeds), and soon spins a large, loose, blackish-looking cocoon, which produces a moth at the end of May. The moth is found commonly on all the heaths of the New Forest and its vicinity.

ZOOLOGY.

PARUS CAUDATUS.—The Long-tailed Titmouse is a bird which ought to be cherished by all possessors of fields and gardens, for there is scarcely a more determined enemy to the many noxious insects which destroy the fruits, vegetables, and flowers. Fortunately for ourselves, the Long-tailed Titmouse is very fond of the various sawflies which work such mischief among our fruit-trees, and often lay waste whole acres of gooseberries; and it is no exaggeration to say that, to a possessor of an orchard or fruit-garden of any kind, every long-tailed titmouse is well worth its little weight in gold. When

then, we come to consider the inestimable and unappreciated services which this tiny bird renders to mankind, we should not only be devoid of all gratitude, but likewise of all common sense—which, however, comes to much the same point—were we willingly to destroy our feathered benefactor.—*Wood, Homes without Hands.*

The Crimson Speckled Footman (*Deiopeia pulchella*).—It has several times been noticed that in what is called a bad season for insects, some conspicuous rarity will turn up in more or less abundance, just as if it waited for such an opportunity to make itself more notable. The very rare and handsome moth above named has occurred this year in various places very diverse from each other. The following may be cited as examples:—Manchester, Ipswich, Newport (Mon.), Brighton, Dover, and Cornwall. Its capture in Devonshire is recorded in last month's Science-Gossip. All the specimens were taken between the 4th and 18th of September; and it is observable that the southern individuals did not appear on the wing markedly sooner than the northern. The reports of these captures do not throw much light upon its habits. On one point, indeed, opinions differ; for while one correspondent of an entomological periodical thinks it of sluggish habit, like most of the footmen moths, another, who followed one for some distance, believes that it is a brisker species than its brethren. —*J. R. S. C.*

Scarcity of the Common Blue Butterfly (*Lycæne Alexis*).—The ungenial weather which prevailed during the spring and early summer of 1871 had a very perceptible effect upon many species of our butterflies, tending to diminish their numbers. Several friends, entomological and non-entomological, called my attention to the particular scarcity of the common blue, which, as it flutters about the fields and lanes, or fans its wings on the blossoms, pleases the eyes of all lovers of nature. There appear to be usually two flights of this species, though stragglers may be seen almost any fine summer's day in ordinary years. In the vicinity of London, and elsewhere in the south, only a solitary one or two appeared of the first brood, and the second was comparatively few in numbers. I attribute this (by conjecture only) to an extensive destruction of the larvæ feeding up in spring.—*J. R. S. C.*

Vampire Bats.—This morning we inspected a coolie's great toe which had been severely bitten by a vampire in the night. And here let me say that the popular disbelief of vampire stories is only owing to English ignorance and disinclination to believe any of the many quaint things which John Bull has not seen because he does not care to see them. If he comes to these parts (Trinidad) he must be careful not to leave his feet or hands out of bed without mosquito curtains. If he has good horses, he ought not to leave them exposed at night without wire-gauze round the stable-shed—a plan which, to my surprise, I never saw used in the West Indies,—otherwise he will be but too likely to find in the morning a triangular bit cut out of his own flesh, or, even worse, out of his horse's withers or throat, whose twisting and lashing cannot shake the tormentor off; and must be content to have himself lamed or his horses weakened to staggering, and thrown out of collar-work for a week, as I have seen happen more than once or twice. The only method of keeping the vampire off, yet employed in stables, is light; and a lamp is usually kept burning there. So numerous and troublesome, indeed, are the vampires, that there are pastures in Trinidad in which—at least until the adjoining woods were cleared—the cattle would not fatten or even thrive, being found morning after morning weak and sick from the bleedings which they had endured at night.—*C. Kingsley, At Last.*

Erratum.—P. 249, 2nd column, 8th line from bottom, for "is spotted on the wings," read "is without spots on the wings."—*W. H. W.*

Size of Snake.—In the last (November) number of Science-Gossip mention is made of a snake's skin being found which measured 3 feet 5½ inches, and it is recorded (as it deserves) for its unusual size. I have, however, in my possession a snake preserved in spirit which was killed within about a mile of this house, in July, 1866, and which measured 3 feet 10 inches in length, 4 inches in circumference, and weighed 1 lb. 2½ oz. This being the actual body of the snake, the measurements are more trustworthy than can be obtained from the mere skin.—*George Guyon, Ventnor.*

The Squirrel.—Within the last seven or eight years squirrels have become quite common about here. I well remember the excitement which the first one caused. The poor fellow, like many pioneers among the genus *homo*, was killed during his explorations in a new district. The same fate befell the second, I believe; the third was captured alive, and I had him in a cage for about three years, when he made his escape through the window. Since that time they have become more and more numerous every year—three, four, and even five or six are sometimes reported as seen together. I myself have never seen more than three. Well, now as to his carnivorous propensities—the subject at present under discussion in Science-Gossip. There is no doubt but that some evidence has been adduced to prove that such propensities exist. *First.* We have G. H. H., who states that the Rev. J. G. Wood says "that it has been known to eat both eggs and young birds, and even mice, killing its live game in a weasel style, by a bite at the back

of the neck." This is not conclusive, as Mr. Sargent very properly remarks, unless "the squirrels he refers to were in a state of *nature*." *Second.* We have the P.S. to the letter of Barbara Wallace Fyfe, which states: "An old naturalist has just informed me that he has often observed squirrels eating the game eggs." *Third.* We have F. A. F., whose evidence I think is the most conclusive of any. We can hardly suppose that he mistook the animal which attacked the little rabbit. All the other evidence, in my opinion, goes for nothing until the question is decided. I don't think we are warranted in shooting down the poor squirrels, as I cannot help supposing but that a carnivorous meal (if I may use the expression) must be of very rare occurrence in the lifetime of a Sciurus. For my part, the pleasure derived from watching this graceful, agile animal skipping from tree to tree is incomparably superior to that pleasure, or, rather, disgust, with which my mind would be filled were I to witness the wholesale slaughter at an English battue. And it is in order to have this slaughter more bloody, more perfect, and more complete, that the gamekeeper is permitted to kill one of nature's most beautiful and graceful creatures. In answer to W. E. L., I may say that I have never observed the squirrels eating the young shoots of pines and firs. I have, however, seen the ground strewn hundreds of times with cones whose scales were nearly all picked off, in order to get at the seeds, and nothing left but the centre. I shall be happy to send W. E. L. some cones thus eaten, at the first opportunity, should he give me his address.—*R. M. Barrington, Fassarol Bray, co. Wicklow.*

P.S. I think it would be very interesting if some reader of SCIENCE-GOSSIP, who may have a squirrel in confinement, would try him with a few eggs, and, having closely observed his *modus operandi* when breaking the shell and eating, let us know the result.

THE SQUIRREL.—I fear that the accusations against the Squirrel, which I see have been made in your interesting pages, are but too true. That he eats young missel-thrushes and other nestling birds; that he strips the shoots off young spruce firs (*Pinus sylvestris*, Scotch pine) till they "strew the ground," are facts but too well known to the woodmen, keepers, and bird-lovers of these parts, in which he swarms. For my part, as a preserver of singing birds, I order every squirrel seen on my grounds to be destroyed. I am very sorry for the squirrels; but I prefer my birds: I do not wish them to be eaten alive, beginning (as the most distinguished English ornithologist assures me) at the bill.—*C. Kingsley, Eversley, Hants.*

IS IT THE SQUIRREL OF MR. GEORGE COX?—In SCIENCE-GOSSIP, No. 82, p. 237, there appears a somewhat harsh stricture by the above-named gentleman on a paper in a former number (80), written by the talented pen of "Miss Barbara Wallace Fyfe." When a young lady gives up the authority for any information she has received, and that authority is worthy of belief, it is both rude, ungenerous, and ungallant to meet her with such a reply as that to which Mr. George Cox has appended his name. However well able Miss Fyfe has shown herself to meet such a phantom in attempted ornithology as this Mr. Cox, it is necessary that I should bear out that young lady's statements as to every word she has put forth with regard to the Squirrel, and the mischievous and predatory animal which the Squirrel really is. When attacked, I hope I have ever been willing and able to defend myself from all assailants; but when a clever girl is assailed, through me, and the truth of her statements doubted by a man really ignorant of the subject on which he labours to be severe, then defence is not only a double duty, but it becomes a pleasure, inasmuch as the weaker side, so to speak, calls for some support. *I have myself detected the squirrels* in sucking pheasants' eggs, wood-pigeons' eggs, and blackbirds' eggs, and shot them from trees up into which they had carried the pheasants' eggs, and were in the act of feasting on them, cup-like, held between their *hands* in the most artistic fashion. I have myself detected them in killing and carrying away young pheasants when hand-rearing at the coops, young wild ducks, and other young waterfowl, and in one instance, in taking some young tufted ducks from a coop, across a field, across a single rail, put to stop cattle from straying down a little running rill, and have found three of these young birds at the foot of a fir-tree, one bitten so severely that it died; but the other two were not perceptibly injured, and when restored to the coop both of these recovered. The keeper then shot both the squirrels, a male and female, from the tree beneath which they had left the birds. I am very fond of rearing and taming young wood-pigeons; but when I first came to my present residence, every egg and, if hatched, every young bird in the nests, was eaten. Mr. Cox unwarrantably assumes that all I said on the subject of the Squirrel to Miss Fyfe was "hear-say." Probably he judged my sources of information on subjects connected with natural history to be similar to those on which he has based his ungenerous attack. Having entered into this explanation, I trust to the generosity of the editor and publisher of the SCIENCE-GOSSIP to give it space.—*Grantley F. Berkeley, Alderney Manor, Poole.*

ELEPHANT PARASITE.—The parasite figured and described by Mr. Richter at p. 132, as *Idoloecoris elephantis*, was previously figured and described by E. Piaget, as *Hæmatomyzus elephantis* in *Tijdschrift voor Entomologie* for 1869, page 249, pl. 11, figs. 1 to 14.

BOTANY.

Preserving the Colours of Dried Flowers.—May I beg "H. E. W.," or some other gifted correspondent, to confer a benefit on me—and, as I know, many others—by describing the process of drying the *Card of Flowers* that she mentions in her able paper on "Skeleton Leaves"? It has always been a failing with me in preserving the colours of some flowers, sometimes rare, that they lose their glowing tints, no matter how carefully they are dried.—*W. W. H., Manilla Hall, Clifton.*

Ergotized Grass.—One of our arable fields is sadly infested with *Alopecurus agrestis*, called by the natives the "black squitch." On going over it this morning we were surprised to see what vigorous tufts of the grass had this year grown in the swede crop. However, upon closer inspection, we were pleased to observe that every specimen had become ergotized to such an extent as to make its seed comparatively innocuous. The extent of the attack may be gathered from the following estimate:—We have rubbed off the locusta of a single spike of the grass, and find their number to be 125. Of these more than half are visibly ergotized, with spurs varying from an eighth to half an inch in length, and the rest seem so imperfect that we have little fear of the pest increasing greatly from the seed of this year's crop. It is fortunate that so poor a grass is not preferred by sheep, as so large a quantity of ergot might have a prejudicial effect upon those in the gravid state.—*J. B., Bradford Abbas, Nov.* 1, 1871.

N.B.—Specimens will be forwarded to any one wishing to possess them.

Calceolaria gracilis.—In Science-Gossip for January 1, 1868, will be found a notice of the occurrence of this interesting little plant on my farm in Dorsetshire, by my former pupil, Mr. J. C. Hudson. It occurred in a large open field, on a bank sloping to the north, and which at one time was occupied with a plantation of wood. It has for some years been under rotation in farm crops. The plant was first found after the barley crop of 1867 was cut, and it continued to flower freely during the mild spring of 1868. Since then, though we have searched most diligently, the plant has not been found until the present October, and it may now be seen dotting the side of the slope in the oat stubble. The question as to how it came there is still a mystery. It grows sporadically, and, like many other wild plants tracking arable cultivation, seems only to be seen on the recurrence of a certain kind of crop. Of course its claim to be considered a native is but slender; still, its position so far from the village, and the comparatively wild and open position in which the plant is found, united to the fact of our specimen having no claim to be considered a garden denizen, point to it as a naturalized agrarian weed.—*J. B., Bradford Abbas, Oct.*, 1871.

Lastrea cristata.—I found during the past summer a few roots of *Lastrea cristata* in a bog almost in the centre of Delamere Forest, Cheshire. Dr. Syme has inspected a frond, and he at once pronounced it to be the true "*cristata*." I do not think that, because the fern is rare, I ought selfishly to keep the locality unknown. I have a better opinion of my collecting friends than to suppose they will ever exterminate any of our rare native plants.—*James F. Robinson.*

Abnormal Arenaria (p. 259).—I have no doubt that Mr. Holland is right in referring "G. S. S.'s" plant to *Arenaria serpyllifolia*, a species which I have found (I think more than once) with foliaceous flowers.—*James Britten.*

Local Floras (p. 259).—My papers on this subject to which you refer, are to be found in the numbers of the *Gardeners' Chronicle* for Aug. 27, Sept. 24, Oct. 22, and Dec. 31, 1870; and Sept. 23, 1871. The reference to "recent numbers" is inexact, and might mislead.—*James Britten.*

Germinating Apple.—A few days ago, on splitting an apple, to whose core some insect or larva had made a small hole, I was surprised to find one of the pips had germinated. The hard outer covering of the pip remained in its original position, the inner part, consisting of a small white bulbous-looking substance and two *bright green* leaflets, was about an inch off, fixed firmly to the interior of the cell into which the core was expanded.—*W. G.*

Monstrous Leaves.—I have by me an oak-leaf, picked off a pollard oak, which measures 11 inches long by 9 inches wide, and a poplar-leaf off a young tree, measuring 9 inches by 8 inches; also a frond of *Blechnum boreale*, the northern hard fern, which has split into two near the tip, and one of these subfronds has further divided into two again, causing the frond to have three points instead of one. I have a bay-leaf that has divided into two leaves joined for about half their length.—*Harry Leslie*, 6, *Moira Place, Southampton.*

Bee Orchis.—I observe in one or two of the late numbers of your interesting periodical Science-Gossip a notice taken of the "Bee Orchis." That pretty flower grows in abundance at Ballystanley, and also in the Deer Park at Mount-Heaton, near Roscrea, in the county Tipperary; but we have known it as the "Bee Ophrys," the name given to it in Mackey's "Flora Hibernica." Will you be so good as to say which is the more correct designation? The gravelled space in the front of my house is occasionally infested with *Nostoc commune;* is there any means of preventing the growth of that unsightly plant, if so I may call it?—*J. F. R., Roscrea, co. Tipperary.*

MICROSCOPY.

Sponge Spicules.—There are two common sponges to which I would direct attention as furnishing interesting spicules. The one is the common freshwater sponge, *Spongilla fluviatilis*, in which are

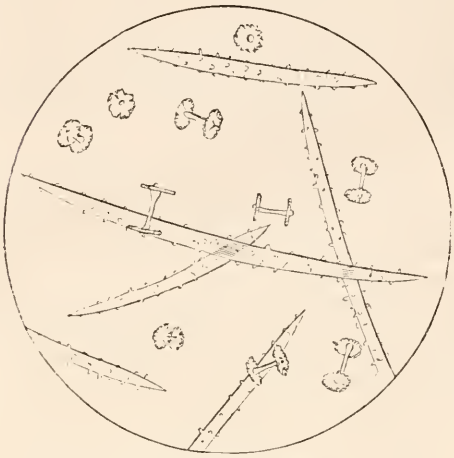


Fig. 159. Spicules of *Spongilla fluviatilis* × 300.

spicules of two forms,—one with two discs like serrated wheels united by an axle, the other slightly curved, pointed at each end, and rough on the surface. These are siliceous spicules, and may be obtained by the use of nitric acid. The other is a marine sponge, but the spicules are calcareous, and would be destroyed by the use of nitric acid. In this case liquor potassæ must be employed to obtain the



Fig. 160. Spicules of *Grantia compressa*.

spicules, which are also of two forms; one being tri-radiate and the other club-shaped at one end and pointed at the other. The sponge is very small and white, and may be found attached to sea-weeds. It is called *Grantia compressa*. These spicules should have a place in every cabinet.—*C.*

Scale of Loach (*Cobitis barbatula*).—We give herewith a figure of the scale of this pretty little fish, which has been obtained and placed at our disposal by our engraver, Mr. George W. Ruffle.

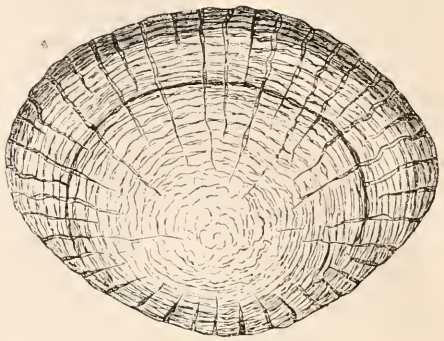


Fig. 161. Scale of Loach.

Paste Eels.—As it may not have fallen to the lot of many of the readers of Science-Gossip to be present at the birth (?) of a paste eel, I will relate a case, leaving it to the learned to decide whether or not a paste eel is *born at all*. Having selected a pregnant eel in which the young were slightly in motion, I placed it on the stage of my microscope, so as conveniently to observe, from time to time, any changes that might take place in their development. The first thing I noticed was one of the young passing slowly up the body of the parent;—subsequently another, then another, until the whole brood were in motion. But that which surprised me most was that they had free course backwards and forwards, from the extreme tip of the tail to the head of the parent; and this action continued for hours, the young, as time went on, increasing in vigour and activity. As the rapidity of their movements increased, the parent eel began to exhibit evident signs of distress, her violent contortions indicating such intense agony that I was greatly pained in seeing her. But the young brood had no such compassionate feelings; they continued rushing to and fro with redoubled energy, seeking a way of exit; and this at last they found in a way I little anticipated,—the rupture of the parent's body, from whence ten young escaped to live on paste awhile, enjoy life, and then pass through a like ordeal. But what became of the old lady? All that was left of the mother was her head, gizzard, and an almost invisible fragment of her skin; the young cannibals had devoured all else of their parent. She had been long defunct; and the violent contortions that had so excited my sympathy were caused by the frantic efforts of the young in endeavouring to escape from their prison-house.—*A. Nicholson.*

NOTES AND QUERIES.

Foreign Names of Borage.—Allow me to correct a printer's error in your October number. The Spanish should have been *Borraa*, not *Borrada*. —*H.E.W.*

White Varieties.—I find a beautiful albino variety of the wild Fritillaria (*Fritillaria Meleagris*) grows plentifully in some fields at Burglifield, near Reading. As I have often heard of people inquiring for the spot, I believe this is not a common flower, but I am no botanist.—*John Henderson.*

Aquaria.—The following error occurs at page 256:—for "Bathelcy," read "Sir Richard Bulkeley." —*H.E.W.*

Saffron.—In a work called "A Tour round England," by Walter Thornbury, at page 290, vol. i., describing why the town of Saffron-Walden is so called, namely, from the great quantities of saffron formerly grown in that part of Essex, the author goes on to say:—"The first seeds or root of this valuable plant were brought from the East by a shrewd pilgrim; tradition says, concealed in the hollow top of the staff which supported his weary feet, and on which he hung his calabash of water. *The orange-juiced saffron is a plant resembling a thistle, yet without down, and the rich dye is extracted from the full-blown flower when dried.*" As it is well known that saffron is obtained from the stigmas of the saffron Crocus (*Crocus sativus*), I cannot imagine to what wonderful plant the above description refers. Can any of the readers of Science-Gossip throw any light on the subject? The author further goes on to say, "When we think of this useful and daring pilgrim, of Peel's parsley-leaf, and of the strange romantic history of that daring renegade Turk who first introduced madder into Avignon, we see that commerce also has its romance." To what does Peel's parsley-leaf refer, and what is the history of this daring Turk?—*J.F.C.*

Bush-Fires in Algeria.—From time immemorial it has been the custom of the Arab herdsmen to burn all underwood from beneath the trees, to produce the tender shoots of which cattle are so fond. To give some notion of the enormous spread of these conflagrations, I have but to quote from the newspaper reports of 1865. In 1863, 110,000 acres were burnt in the province of Constantine alone; whilst in 1865 the damage done amounted to 258,755 acres. In the arrondissement of Guelma 35,600 acres were destroyed. The forest of Tefeschoon was burnt straight down to the sea (*Moniteur d'Algerie*).—*Hon. L. Wingfield* (*Under the Palms*).

The Squirrel.—I would refer those readers of Science-Gossip who do not believe that squirrels are in the habit of destroying young birds, to a work written by a very old, much-valued friend of mine, entitled "My Life and Recollections. By the Hon. Grantley F. Berkeley." There, in a chapter devoted to Natural History, vol. iv. page 197, they will find described by Mr. G. F. Berkeley what he has himself seen—*not* what his keepers have reported to him—of the destructiveness of this beautiful little animal. He gives a most graphic account of his discovering two old squirrels frisking about with three of his young tufted ducklings, which they had carried off from a shallow piece of water within sight of the old foster-mother hen, who, confined within the coop, could not come to the rescue. The three little ducks were alive when found by Mr. Berkeley in captivity, but one soon died of the wound inflicted by the squirrel, who, when Mr. Berkeley first appeared on the scene, had the helpless duckling in its mouth: the other two had not been hurt. Mr. Berkeley likewise mentions their affection for pheasants' eggs. He shot one in the act of sucking an egg in Bedfordshire, and he adds, that it was impossible to preserve either cushat, turtle-dove, or blue rock, in his grounds or woods at Alderney Manor, in consequence of the raids made by the squirrels on both eggs and young birds. I certainly never saw so many squirrels in my life as I did in that neighbourhood, and in the vicinity of Bournemouth, which is within a short drive of Alderney; but I never happened to see one shot. However, I do know that it was found requisite to wage war against them, and that I once had a dear little pet in an "Alderney" squirrel, given me by its kind master, whose "Life and Recollections" I strongly recommend to the notice of your readers. —*Helen E. Walney, Bryn Hyfryd.*

Albinism in Plants and Animals.—Seeing in Science-Gossip several notices of white varieties of plants, the following may not be uninteresting. A short time since I found a specimen of *Campanula hederacea* with *one flower only* an albino; all the others on the same plant were of the normal colour. I may mention that the albino was not a pure white, but a very near approach to it. In the same locality I found three other specimens of the same plant having all the flowers of a beautifully delicate white, and the plants partaking more or less of the albino characters. The typical forms were very abundant all round. They were growing on a loose sandy soil. I think with J. H. A. Jenner, in the October number of Science-Gossip, that albinism is to a certain extent connected with calcareous soils; for I have noticed that on mountain limestone yellow flowers predominate, and white varieties are common, whilst on clays and sandy soils blue and white prevail. But, in addition to the effect of certain soils, may not meteorological influences have helped to produce the *extra* number of white varieties which have been noticed this year? The early spring and summer being wet and cold would exert a prejudicial influence upon the growth of both plants and animals; for I have also found several white varieties of shells,—one of *Helix rufescens* and another of *Zua lubrica*, whilst many nearly white varieties of *H. ericetorum* and *H. virgata* have been found.—*Hugh Perkins, Sibford, near Banbury, Oxon.*

The Hysteriaci.—The last number of the *American Naturalist* contains a paper by Dr. Billings upon this group of fungi illustrated by a plate which does not reflect much credit upon American art. The paper itself is open to more grave objections than the plate, since it ignores all value in the external features of the peritheeia, and follows the fatal but unfortunately too common plan of accepting the fruit as all-sufficient for specific characters. Dr. Billings is new to the field, but we trust that this maiden effort is not to be accepted as a type of what we are to expect in mycology from beyond the Atlantic. There is evidence of good work in the communication, but unfortunately turned to bad account; let us hope that a little more experience, and a little more reflection, will, with time, work wonders.

Insects and Flowers.—In answer to E. C. Lefroy, I can state that, although I have not noticed the particular cases of predilection that butterflies have for flowers of their own colour which he refers to, still I have been equally surprised at the preference that it seemed to me all butterflies, and a great number of other insects, have for flowers of a *Blue* or *purple* tint, excepting the common Garden White, which always appeared to me to appreciate the delicate *pink* of the moss or cabbage rose, or the *white* candytuft, if there was any in the garden. This summer, too, I captured myriads of the *small blue* and *common Burnet moth* while visiting Ireland, on a railway bank, within a few yards of the sea, on which were growing profusely the common Ladies'-fingers (*Anthyllis vulneraria*) and the Rest-harrow (*Ononis arvensis*), and here and there the beautiful mountain Cranesbill (*G. pyrenaicum*). Leaving this bank, not one was to be seen; but when I reached home I found an extremely large lavender hedge in the garden in full blossom, together with another trailing plant of exactly the same tint, of which I forget the name, literally covered with the small Tortoiseshell and common brown butterfly. But I can hardly fancy that it is the colour alone that induces the butterflies to settle on certain flowers, but that the flavour of the nectar influences the colour of the blossom, and so is a kind of index to the butterflies' taste. For instance, I never saw a butterfly, to my remembrance, settle on a red geranium or pelargonium.—*W. W. H.*

Tennyson on the Habits of Certain Flies.—We must criticise sometimes, even where we admire; and although I consider *In Memoriam*, taken as a whole, one of the most masterly poetical performances in the English language, I decidedly dislike the third stanza of the 49th section. Its Natural History is certainly very perplexing. Appealing to his departed friend, the bard cries—

> "Be near me when my faith is dry,
> And men the flies of latter spring,
> That lay their eggs, and sting, and sing,
> And weave their petty cells and die."

Considerable liberty is allowed to poets, as we know, and this poetic license plays strange tricks with grammar; but in the stanza cited it is questionable whether the omission of a verb in the second line is not going beyond the privilege conceded to a writer of verse. Passing from that, however, I cannot but think that these flies are very remarkable creatures! I have as yet failed to find them, but that may be because I don't precisely understand what the poet means by "latter spring." If it be the period when spring is merging into summer, then we should look for them in May or June. However, a friend suggests that as flies are more abundant in the autumn of the year, by "latter spring" the poet may mean those occasional fine days which we get towards the close of the season, and which have at times the balminess of spring. Now, these flies are represented as doing four things: they "lay eggs," which seems natural enough; and, though placed first in the stanza, need not be supposed to be first in order of time. But, then, they "sting and sing;" *sing*, be it observed—not hum or buzz. And, to crown all, they "weave cells"—an extraordinary proceeding for any imagos of Diptera to betake themselves to. And yet the description could hardly apply to bees, though stings are mentioned. I am afraid this stanza is a proof that Tennyson is no entomologist; or, at least, was not when he wrote thus. However, we can hardly expect that a poet should write like a naturalist; and I would rather he should be a little erratic from science than attempt anything so elaborate as Darwin's "Botanic Garden." Still, it would be interesting to know if the author of *In Memoriam* really intended to refer to any particular species of insect, the habits of which he may have partly observed and partly conjectured. —*J. R. S. C.*

A Great Take of Honey.—A tree was felled the other day at Sandy Creek, Wagga Wagga, for the purpose of procuring honey, which it was known had been collected there by a rather large swarm of bees. When the tree was cut down there was found in the hollow one of the most astonishing collections of honey ever known, probably, to have been gathered by one swarm of bees. There were several immense layers of comb ten feet in length, and of great density, extending along the inside of the trunk, and almost clothing the hollow of the tree entirely. After it had been carried home (having been wasted considerably by the fall of the tree and the primitive mode in which it was collected), the comb yielded over 200 lb. of honey of the purest quality.—*Melbourne Argus.* The above extract from an Australian paper will, no doubt, be of interest to bee-keeping subscribers of Science-Gossip. I find the past season has been a very bad one for honey in this part of the country, though I was fortunate enough to obtain two large wooden supers from my single Woodbury hive, one of which was very well filled, and the other not half completed. In 1870 I had one super sealed over: these supers, when full, contain 30 lb. to 32 lb. of pure honey, unless we should be so unfortunate as to allow the queen to ascend, when a quantity of brood comb is the result.—*J. Henderson, Reading.*

Snipe.—Walking on Dartmoor on the 22nd October last, I saw a wisp of forty-three snipe. Is not this an unusually large number? They wheeled round within thirty yards of me three times before starting off northwards, presenting a lovely spectacle as they glittered in the sun. Their little bodies shone like silver, and quite made us all think of the similarity the sight bore to fireworks.—*F. A. F.*

Recollections of a Hen.—A pet hen which was left at liberty when young, and allowed admission to the kitchen, was after a time put into a fowl-house with others, and kept there a year and a half, not being let out during that time. A few days ago, Judy—*i.e.* the pet—was, with the other fowls, put into the garden, where, after a little time, Judy was missed, and, on looking for her, she was found quite at her ease by the kitchen fire.—*A.E.*

Stings.—"J. W. W." will not, I am afraid, find a detailed account of the many varieties of stings in any *one book*. With regard to the stinging properties of nettles, he will find a short explanation in Bentley's "Manual of Botany" (p. 51). For information respecting the minute anatomy of the stings of wasps and bees, "J. W. W." cannot do better than refer to Dr. Mill's excellent paper in Science-Gossip for 1868 (p. 148, July number). On the poison-glands in spiders, there are several good articles in Science-Gossip for 1866. There are poison-glands in the nettle; and the poison is no doubt *acid*, like that of most of the animal poisons.—*C. K. R., L.R.C.P. Lond.*

"PHRYGANEA"?—On the 15th of September I found some masses of transparent jelly-like substance, containing numbers of eggs, arranged in regular rows. These were deposited on the leaves of a willow bush and other water-loving plants overhanging a pond. I took some of them home, and after keeping them for about ten days, I put them, leaves and all, in a gallipot half-full of water. About the end of the month I found that some larvæ had come out. These I examined with a lens, and they appeared active little creatures, superficially resembling the larvæ of *Dytiscus marginalis*. On the 3rd of October I again examined them, and found that the greater part had formed cases for themselves of fragments of the decayed leaves. They now looked exactly like miniature caddis-worms. Owing to leaving home, my observations ended a day or two after this. Can any of the correspondents of SCIENCE-GOSSIP supply the rest of the history, and tell me whether I am right in supposing that these observations apply to the earlier stages of the genus Phryganea (Stephens)?—*Harry Leslie*, 6, *Moira Place, Southampton*.

CORETHRA PLUMICORNIS (*Phantom Larva*).—I have kept one of the larvæ of this insect for the last six weeks in a *tightly-corked* bottle, holding a drachm and a half of water. It has for its companions several green hydræ (*Hydra viridis*). The larva does not seem inclined to make a meal of them, or in any way to annoy them. It has grown considerably since I captured it. Can any of your numerous readers tell me what the perfect *Corethra* is like?—*C. K. R., L.R.C.P. Lond.*

FOX-MOTH LARVÆ.—In reply to R. Garfit, though my own attempts to keep the larvæ of the fox-moth have been unsuccessful, I heard of a plan (that has been successfully tried) the day before SCIENCE-GOSSIP came to hand. It is simply to put the larvæ in a box with sand, bits of turf, and moss. The box should have holes bored in the bottom, and a perforated zinc top, and should be kept out of doors exposed to the weather; and any green stuff that can be got may be put in, for my informant said there were several things they would nibble in winter. I should, of course, get food as nearly like their usual diet as I could. In my own experiment I kept the box in a cool cellar; and though the larvæ lived until I could get food, they had gradually dried up until they were like little dried sticks with a morsel of life in them. They could move a little towards the food, but were too far gone to eat.—*C. L. Y.*

CANINE PREDILECTION FOR FRUIT (p. 263).—I have a retriever which resembles "W. M. A. W.'s" terrier in her fondness for fruit. In the summer she used to help herself to strawberries and gooseberries, but will eat almost any fruit that is given to her, and has a decided liking for an uncooked *pomme de terre*.—*G. H. H.*

REMEDY WANTED.—Can any of the readers of SCIENCE-GOSSIP help one in the following difficulty? My house is built of brick, covered with Roman cement. Last summer I had it re-painted; and, unfortunately, as is always the case, it looked very well for about a fortnight, and then dark patches, usually at first of a light purple colour, afterwards turning much deeper, made their appearance. This, on examination, proved to be a fungus of that class which is composed of a multitude of single spores. It seems in time to eat away both the paint and the surface of the cement; and grows, not only near the ground, but also higher up, but generally not above five to seven feet from the surface. It cannot be the damp, as the side where it chiefly commits its ravages faces the south, and receives the full force of the sun. The builder says it is by no means uncommon, but that it has never yet been accounted for; some supposing it to be caused by using unwashed sea sand in the mortar or cement. I therefore appeal to the readers of SCIENCE-GOSSIP to inform me, if they can, of any means to kill a fungus under these circumstances. For the encouragement of those who try to oblige me, I will add that the builder assures me that he who discovers a remedy will speedily make his fortune. On this point, however, I *think* there may be some doubt.—*A. E. M.*

A POMERANIAN DOG in the possession of a relation of mine is somewhat akin to the little terrier mentioned by your correspondent "W. M. A. W." She will eat raw eggs with much relish, making a hole in the shell, and wasting but little. She will eat nuts, cracking them herself; also sweetmeats greedily. This Pomeranian has a very good temper, allowing children to do just as they please with her, tumbling and rolling her about seemingly much to her delight.—*Charles J. W. Rudd.*

WHITE SHREW.—At the end of October a shrew of a pure white colour was sent me, but it was quite unfit for preservation, as, on attempting to skin it, all the fur from its under parts came off. I preserved its head and a portion of the skin as a novelty. Is such a variety of rare occurrence, or must we place it on the same list as the white stoat? I have several times seen the latter, but cannot recollect ever seeing a white shrew before. Why is it that the Mole, Shrew, &c., so soon decompose after death? All who are interested in the preservation of their own zoological specimens must have observed that decomposition takes place much sooner in the above species than in many others.—*G.B.C., Ringwood.*

MANUSCRIPT MAGAZINE ON NATURAL HISTORY.—Having space for a few new members, I shall be happy to hear from any lady or gentleman who would like to join us.—*G. B. Corbin, Ringwood, Hants.*

STAG BEETLE.—I should like to inform Mr. Warner that the "terrible jaws" of the Stag Beetle *are* useful in a sense which those who have experienced it would, I am sure, not think passive. If he had ever been so unfortunate as to get a pinch, I do not think he would have said that they only served to menace and terrify, but that they both looked and were formidable instruments of self-defence.—*I. E.*

LOCAL FIELD CLUBS.

VALE OF YORK FIELD NATURALISTS' CLUB.—Honorary Secretary, John T. Carrington, Esq., 12, Micklegate, York.

THE GLASGOW SOCIETY OF FIELD NATURALISTS.—Rooms, 187, George Street, Glasgow; James Allan, Vice-President, 57, West Nile Street.

STALYBRIDGE NATURALISTS' CLUB.—David Jolliffe, Secretary, Working Men's Institute, Ridge Hill Lane, Stalybridge.

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them.

W. W.—There is no British work. For descriptions and classification, see Rabenhorst's "Flora Europæa Algarum."

T. H.—Lists are ineligible.

A. G. B. R.—It is beyond the range of our experience.

J. H. D.—The Cow-parsnip, *Heracleum spondylium*. The fungus is *Erysiphe Martii*.

R. J. C. S.—Consult "Bechstein's Cage-Birds," of which a new edition is just published by Robert Hardwicke, 192, Piccadilly.

E. G. V.—*Melampsora populina*.

F. R. M.—We really cannot repeatedly answer the same questions, which a reference to our previous volumes would solve in an instant. Apply to Mr. Janson, Museum Street, Bloomsbury.

J. W. G.—Apply to Mr. How, Foster Lane, Cheapside, E.C.

J. A.—Sent by post.

M. A. J.—The Shells are *Trochus (Gibbula) magus*, L., and *Venus gallina*, L.—*C. A. S.*

R.E.—The insects are *Pimpla instigator*.—*E. S.*

W. E.—*Calluna vulgaris*, var. *tomentosa*.—*J. B.*

Rubi Germanici.—Weihe & Nees ab Esenbeck's "Rubi Germanici," 1822-7, folio, was originally three guineas. A copy at thirty-six shillings is noted in the last catalogue (No. 204) of Friedlander & Son, Berlin.

W. N.—We are unable to name the larvæ. We know of no *cheap* work giving the English and Latin names of British insects in all orders. Such could hardly be a very small book, or a very cheap one, if it were published. You may obtain such a guide to the Lepidoptera, and catalogues of some other orders.

S. A. S.—The lichen is *Bæomyces byssoides*, L.—*C. W. C.*

A. I.—1. *Lecanora tartarea*. 2. *Lecanora atra*.—*C. W. C.*

J. S.—1. Polyzoon, *Bugula plumosa*. 2. Hydroid Zoophyte, *Sertularia argentea*.—*W. S. K.*

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Australia.—A gentleman would be glad to open a correspondence with a view to exchanges of microscopical specimens.—Address, F. Barnard, Kew, Victoria.

British Mosses (correctly named) for British Sea-weeds.—T. Rogers, 27, Oldham Road, Manchester.

Fossils from Coal-measures and M. Limestone for fossils from the Devonian.—G. Rowbotham, 8, Parsonage Street, Derby Street, Salford.

Eggs of Silkworm for any object of similar interest.—T. Pickin, Mont Fields, Salop.

Mosses and Lichens offered in exchange for others.—Send list to R. V. T., Withiel, Bodmin.

Pupæ of *S. Ligustri* and perfect insect of *D. cæruleocephala* and *Corydon* offered for good microscopic slides.—E. Lovett, Holly Mount, Croydon.

West African Beetles collected by Du Chaillu; Minerals, some rare, offered for microscopic slides.—G., 20, Maryland Road, Paddington, W.

One dozen good slides (two dozen if requested) of selected Diatoms, Spicules, &c., for Bermuda earth, genuine Ichaboe guano, or equal diatom material.—Rev. J. K. Jackson, Talbot Street, Oldbury, Birmingham.

Gastric Teeth, mounted, for others. — Lists to be forwarded to W. H., 46, Charlotte Street, Hull.

Silene maritima and *Spergularia rupestris*, seeds of.—Send stamped directed envelope and object of interest to Dr. Webb, 12, Brougham Terrace, West Derby Road, Liverpool.

For Sand containing Foramimfera, &c., send object and envelope to W. A. G., 10, Park Shot, Richmond, Surrey.

Coal Fossils in exchange for others.—C. Robinson, 22, Broughton Road, Salford.

Argynnis Paphia and *A. Euphrosyne* in exchange for birds eggs; the former not perfect.—Send list to W. W. W., Baldock, Herts.

Unio crassus, Retzius=*sinuata*, Lam. (from the Loire, &c.), not *Unio littoralis*, Drap.=*crassus*, Lam., wanted for other species.—W. White Walpole, Holmwood, Kingston-on-Thames.

Fine dried Heaths named by Professor Bentham, and British Mosses (scarce), Lower Lias fossils, offered for London clay and other fossils.—N. 20, Maryland Road, Paddington, W.

Ancylus oblongus, in exchange for any other British shells.—Address, H. Perkins, Sibford, near Banbury, Oxon.

Characteristic Carboniferous Fossils for the same from any of the Tertiary formations.—J. Harker, R.M. Lane, Richmond, Yorks.

Plants.—Nos. 158, 555, 556, 558, 707, 820, 954, 1020, 1155, 1176, 1262*, 1267, 1286, Lond. Cat., for other rare species.—Lists to A. B., 107, High Street, Croydon.

British Land and Freshwater Shells for others (British).—Address, A. H. S., 50, Arlington Street, Mornington Crescent, London.

Volvox globator (mounted), in exchange for other good mounted microscopic objects.—John C. Hutchison, 8, Lansdowne Crescent, Glasgow.

Foraminifera from soundings for Atlantic Cable (well mounted), offered in exchange for a good slide of Diatoms or Polycistina.—G. Bowen, 95, Hampton Street, Birmingham.

Scales from various species of Ferns (mounted in balsam) offered for good named slides.—Edward Ward, 9, Howard St., Coventry.

Crystals of Oxalate of Chromium and Potassium, Salicine, Pyrogallic Acid, &c., well mounted for Polariscope, for other good objects.—J. Hunter, 45, Kensington High Street, London.

For Celery and Raspberry Brands, send stamped address to Isaac Wheatley, Malling Street, Lewes. Any microscopical object acceptable.

Sheep Tick.—For a well-mounted specimen send address, &c., to A. Allen, Felstead, near Chelmsford.

BOOKS RECEIVED.

"The Monthly Microscopical Journal," for November, 1871.

"Land and Water." Nos. 362, 363, 364, 365.

"Description of an Electrical Telegraph," by Sir Francis Ronalds, F.R.S. 2nd. Edition. Williams & Norgate.

"The American Naturalist." Nos. 8 and 9. September, 1871.

"The Journal of Applied Science," for November, 1871.

"The Animal World," for November, 1871.

"Proceedings of the Bristol Naturalists' Society," 1871, January to May.

"Cope's Tobacco Plant," for November, 1871.

"Hindu View of Cholera." A Lecture by Golaub Sing, M.D.

"Narrative of the Proceedings of the third Meeting of the Worcestershire Naturalists' Club at Broadwas," Aug. 31, 1871.

"Archives of Science and Transactions of the Orleans County Society of Natural Sciences." No. 4. July, 1871.

"The American Naturalist," for October, 1871.

Appendix to papers on the Cause of Rain, &c. by G. A. Rowell.

Communications Received.—W. H.—J. B.—A. B.—F. A. F.—E. G. V.—W. H. W.—H. A. A.—E. C. L.—J. H.—H. E. W.—A. L.—R. J. C. S.—J. F. C.—F. B.—T. E. A.—G. G.—C. K.—J. H. D.—T. R.—S. A. S.—W. W. H.—A. G. B. R.—W. W. W.—R. V. T.—T. O. W.—A. W. W.—T. H.—E. V.—C. J. W. R.—M. M.—T. P.—G. R.—J. R. S. C.—W. G.—H. L.—R. H. W.—J. F. R.—F. B.—E. H.—C. C. A.—H. P.—E. B.—G. H. H.—J. W. G.—J. H.—A. B.—A. I.—W. G. N.—J. F. R.—T. G.—G.—G. B. C.—R. M. B.—G. B.—H. B. L.—W. W. W.—J. A.—G. H. W.—G. G.—J. S.—D. J.—J. C. H.—C. R.—E. C. J.—C. L. J.—J. K. J.—A. E.—W. A. G.—A. E. M.—C. K. R.—J. B.—N. R.—E. L.—A. H. S.—J. H. G.—J. F. C.—F. R. M.

INDEX TO VOL. VII.

Abnormal Cerastium, 259, 279.
Abnormal Rubus, 186.
Absinthe, 116, 189.
Absorption of Air by Plant-tissues, 91.
Abundance of Insect Life in the Tropics, 66.
Acorns, 83.
Æcidium statices, 156, 188.
Æcophylla smaragdina, 127.
African Diamonds, 11.
Air, Absorption of, by Plant-tissues, 91.
Albinism in Plants and Animals, 281.
Albino Blackbirds, 208.
Algæ, preserving, 20.
Algeria, Bush-fires in, 281.
A likely Story, 18.
Along the Shore, 253.
American Moth-trap, 216.
America, Sparrows in, 215.
American Workshop, Chips from an, 85.
Amplification of Microscopic Objects, 236, 260.
Anchovies, 17.
Anecdotes, twice-told, 192, 212, 237.
Anemone Infusoria, 115, 142.
Anguis fragilis, 160.
Animals, Kindness to, 136.
Ant Guests, 231.
Ant, the large Wood-, 198.
Ant, the Yellow, 183.
Anthea cereus, 212.
Ants, 17, 127, 245.
Ants and their Slaves, 273.
Ants, Robber, 270.
Ants, White, 1, 90.
Apparatus for Sounding, 117, 137.
Apple, Germinating, 279.
Aquaria, Marine, 196, 256, 281.
Aquarium, a Turbid, 93.
Aquarium Query, 46, 93.
Arabia, Butterflies of, 137.
Arge Galathea, Parasites on, 233, 258, 262.
Artificial Swarming of Bees, 15.
Ascent of Man, 165.
A Shark's Meal, 17.
August, May in, 210.
Awbe, 119, 143.

Baby Hippopotamus, 88.
Baby Spiders, 18.
Badgers, 41.
Bait for Soles, 237, 261.
Barbel, Scale of, 188.
Barnacles, 112.
Bath, Insects at, 229.
Bath White, the, 263.
Bat in Sunshine, 161, 215.
Bat, the Vampire, 233, 277.
Bats, 41.
Bats, out in Winter, 66.
Beaks of Insectivorous Birds, 226.
Bee, Fish-tail hairs on Humble, 140.
Bee Orchid, 215, 239, 259, 279.
Bees and Soot, 71, 116.
Bees, Artificial Swarming of, 15.
Benzole *v.* Camphor, 93.
Big Trees in Missouri, 67.
Big Vines at the South, 67.
Birch, the, 46.
Bird-music, 233.
Bird Prognostication, 159.
Birds! Birds! 10.
Birds and Flowers, 63.
Birds, Beaks of Insectivorous, 226.
Birds' Nests, Extraordinary Position for, 161.
Birds of Europe in New Zealand, 209.
Birds, the Song of, 92, 150.
Birds, to Clean, 214.
Blackbirds, Albino, 208.
Bleaching Zoophytes, 143.
Blind-worm, the, 160.
Blister-fly, 232.
Blood, Shower of, 45.
Blue-bottles once more, 261.
Blue Butterfly, Scarcity of the Common, 277.
Boilers, Lime Deposit in, 23, 47.
Bone and Teeth, Sections of, 14.
Books, New, 226.
Borage, Foreign Names of, 238, 281.
Borax and Cockroaches, 117, 142, 166, 168, 214.
Borrago, 139, 214, 239.
Bosphorus, Cormorants in the, 42.
Botanical Exchange Club, London, 96, 114, 117.
Botany, Prize Competition, 274.
Bother the Pigs! 47.
Boulder, the Story of a, 5, 94.
Brazil, Night-flies in, 90.
Brazil, the Cicada in, 71.
Brighton, *Deiopeia pulchella* at, 234.
British Butterflies, 133.
British Butterflies in India, 209.
British Caterpillars, Horned, 193.
British Cluster-cup, New, 156.
British Coleoptera, Books on, 191.
British Desmids, New, 44.
British Diatomaceæ, 68, 188.
British Fungi, Handbook of, 188, 226.
British Insects, Defensive Resources of, 248.
British Jelly-fishes, 237.
British Moss, New, 199.
British Tortoises, 263.
Brittany, Notes on the Fauna of, 244.
Broad, on The, 49, 94.
Broom-rape, Picris, 119.
Budget of Queries, 143, 166, 167.
Bullets in Mounting, 140.
Bullfinches, Captive, 154, 183.
Bunt of Wheat as a Lens, 92.
Bush-fires in Algeria, 281.
Bustard, the Great, 42, 66.
Butterflies, British, 133.
Butterflies, British, in India, 209.
Butterflies of Arabia and Egypt, 137.
Buxbaum's Speedwell, 114, 139.

Calamites, 202.
Calceolaria gracilis, 279.
Cammocke, 114, 142.
Campanula, Double, 186.
Camphor *v.* Benzole, 93.
Canada Goose, 156.
Canada, the Firefly in, 232.
Canary, Peculiarity of a Hen, 238.
Candle-snuff Fungus, 77.
Canine Predilection for Fruit, 263, 283.
Captive Bullfinches, 154, 183.
Carp, Scales of, 20, 140.
Carrier Pigeon and Plover, 229.
Carrion Crow, 158.
Cat, an Intelligent, 88.
Catalogues of Insects, 138.
Caterpillar, Transformation of a Hairy, 65, 95.
Caterpillars, Horned British, 193.
Cat-ology, 185.
Cats in Great Britain, 162.
Cause of Sleep, 119.
Cells, 20, 22, 23, 44.
Cells in Coleus, 237.
Cement, Foulkes's, 142.
Cerastium, Abnormal, 259, 279.
Chærocampa celerio, 209.
Chanting Mice, 274.
Chicken with four legs, 258.
Chips from an American Workshop, 85.
Cholera, the Mina and the, 87.
Chrysanthemum, the, 91.
Cicada in Brazil, 71.
Cladodus mirabilis, 21.
Clay, Story of a Lump of, 125.
Cleaning Birds, 215.
Cleaning Diatoms, 105.
Cleaning Shells, 118.
Cleaning Skeletons, 165, 191, 213, 239, 262.
Clever Tomtit, 82.
Clifden Nonpareil, 263.
Cliffs, Swallows building on, 233.
Climbing Rats, 47, 66.
Cluster-cup, New British, 156, 188.
Cockchafers and their Larvæ, 167, 184.
Cockroaches and Borax, 117, 142, 166, 214.
Cockroaches, Destruction of, 190, 212, 168, 214.
Cock Robin, 18, 46, 70, 94.
Coleoptera, Books on British, 191.
Coleus, Cells in, 237.
Collecting-case, Ireland's, 125.
Conservatory, Stove for, 167.
Coral, Cleaning, 94, 117.
Corethra plumicornis, 283.
Cormorants in the Bosphorus, 42.
Cornish Sucker, 206.
Cornwall, Depth of Soil in, 70.
Correction of Lenses, 117.
Cotssold Lion, 119, 142.
Covering Objects, 115.
Cowslips and Primroses, 133.
Cows, Musical, 22.
Crab and its Claws, 95.
Crab, the Hermit, 64.
Crags, Story of the, 271.
Crass, My, 13, 42.
Crass, the Locomotion of, 65.
Crimson-speckled Footman, 234, 239, 262, 277.
Croydon Microscopical Club, 141.
Crustacea, Moulting of the, 112.
Cuckoo, Early Appearance of the, 111.
Cuckoo, the, 158.
Cultivation influencing the Insect World, 66.
Cuphea platycentra, 81.
Curious Friends, 118.
Curious Wood, 23.
Currants, Home-grown, 67.
Cyclostoma elegans, 42, 85.
Cypress of Lomma, 71.
Cyrena fluminalis, 162.
Cystea montana, 261.
Cystopus Lepigoni, 259.

Dahlia, the, 46.
Daisy, the Michaelmas, 67.

Darkling Spiders, 12, 46, 152, 215.
Defensive Resources of British Insects, 248.
Deiopeia pulchella at Brighton, &c., 234, 239, 262, 277.
Descent of Man, 112, 143.
Desmids, New British, 44.
Destruction of Plants by Goats, 70.
Devon, Zante Currants in, 114.
Diamonds, South African, 11.
Diatomaceæ, British, 68, 188.
Diatoms, Cleaning, 105.
Dipterous Larvæ under Tortoise-shell, 41.
Dissecting Microscope, New, 44, 68.
Dog and Monkey, 41.
Dog, a Street, 223.
Dogs and Eggs, 283.
Dogs and Fruit, 263, 283.
Dogs, Entozoa in the Heart of, 184.
Dolomitic Conglomerate, Fossils of the, 93, 143.
Dos à Dos, 71.
Double Campanula, 186.
Double Orange, 106.
Dragon-flies in the Metropolis, 17, 46.
Dredge, Naturalists', 143.
Dried Flowers, Preserving Colours of, 279.
Duck's Egg, Gigantic, 262.
Duration of Pupa State, 112.

Early Appearance of the Cuckoo, 111.
Early Gardeners, 19, 43.
Early Visitors, 113.
Earthquakes, Law of, 40.
Earthworms, 118, 142, 143, 166, 167, 189, 212, 262.
Earwigs, 94, 116, 119.
Echinodermata, 45.
Echinodermata, Pedicellariæ of, 42, 119.
Eel-pout, 20, 30.
Eels in Paste, 280.
Eggar Moth, the Small, 90, 113, 116, 165, 213, 237, 257, 263.
Eggar Moth, the Oak, 213, 238, 262.
Egg, Double, 118.
Egg of the Kestrel, 237, 262.
Eggs, 207, 262.
Eggs, Dogs and, 283.
Eggs, Formation of, 21.
Eggs, Hunting for Insects', 32.
Eggs of Lepidoptera, 70, 93, 94.
Eggs, Tortoise, 208, 263.
Elecampane, 129.
Electric Stockings, 45, 69.
Elephant Parasite, 131, 185, 211, 234.
Elm, the, 91.
English Herbs as substitutes for Gentian, 116.
English Mocking-birds, 153.
Entomological Season of 1871, 208.
Entozoa, 208.
Entozoa in the Heart of Dogs, 184.
Ergotized Grass, 279.
Errata, 239, 262, 277.
Errors, Popular, 70, 92, 93, 117.
European Birds in New Zealand, 209.
Everlasting Flowers, 239.
Exchange Club for Botanical Specimens, 96, 114, 117.
Extraordinary Positions for Bird's Nest, 161.
Eyestones, 21, 46, 69, 89, 93, 95.
Eye, the Human, 31.

Facts, the Year-book of, 71.
Fasciation in *Œnothera biennis*, 186.
Field Club for South-west London, 92, 116.
Field Clubs, 263, 283.
Fiery-crested Wren, the, 88.
Firefly in Canada, 232.
Fishes, how they breathe, 257.
Fish in the Jordan, 166, 189, 213.
Fish Scales, 20, 44, 140, 164, 188, 236, 260, 280.
Fish, Subterranean, 112.
Fish-tail Hairs of Humble-bee, 140.
Flea, Gizzard of the, 93.
Flea, Parasites in the Interior of a, 88.
Flea, the, 155.
Fleas! Fleas! 97, 155.
Flies, Plague of, 238.
Flies, Tennyson on, 282.
Flint Flakes, machine-made, 190.
Floral Stars, 210, 239.
Floras, Local, 163, 187, 212, 214, 259, 279.
Flowers and Birds, 63.
Flowers and Insects, 258, 282.
Flowers, Language of, 91.
Flowers, Preserving Colours of dried, 279.
Flowers, Variations in Colour of Wild, 270.
Folk-Lore, 213.
Food of Spiders in Dark Cellars, 215.
Food of the Weasel, 42.
Forest, a Tropical, 94.
Forest Fires in the United States, 70.
Formation of the Hen's Egg, 21.
Fossil Oolitic Plants, 157, 212.
Fossil Plant known as Calamite, 202.
Fossils of the Dolomitic Conglomerate, 93, 143.
Foulkes's Cement, 142.
Fox-moth Larvæ, 263, 276, 283.
Fox-moth, the, 276.
Freshwater Molluscs, 89.
Frog, Lung of the, 92, 120.
Fungi, Handbook of, 188.
Fungi, Luminous, 69, 91, 118.
Fungi, Microscopic, 236.
Fungi, Polymorphic, 43.
Fungus, the Candle-snuff, 77.
Fungus Theory, the, 23.
Furness Abbey, 210.
Furze Mites, 236.

Gardeners, Early, 19, 43.
Garden Oracle, 47.
Gas Lantern, Objective for, 68.
Gentian, 91, 119, 139, 143.
Gentian, English Herbs as substitutes for, 116.
Geology Prize Competition, 274.
Germinating Apple, 279.
Gigantic Duck-egg, 262.
Gill of Swordfish, 136.
Gipsy Moth, 215.
Gizzard of the Flea, 93.
Glass Windows, Hawks and, 238.
Glow-worm Light, 207.
Gnaphalium, 239.
Gnat, the, 108, 162, 191.
Gnat, the Plumed, 18.
Goat-moth, the, 225.
Goats, Destruction of Plants by, 70.
Golden Oriole, the, 158, 258.
Gold-fish, 237.
Goldilocks, 19.
Good little Robin, 207.
Good Microscopes, 68.
Goose, Canada, 156.
Goose, Longevity of the, 112, 167.
Gorgoniadæ, 52, 92, 112.
Gossip about Locusts, 79.
Grass, Ergotized, 279.
Grasses, Preserving, 261.
Grayling, Scales of the, 164.
Great Bustard, the, 42, 66.
Great Take of Honey, 282.
Gregories, 47, 71.
Griffithsia corallina, 215.
Guests of Ants, 231.

Hairs of Plants, 83, 204.
Hairs of Sundew, 204.
Hair-tail, 17, 88, 113.
Hairy Caterpillar, Transformation of, 65, 95.
Handbook of British Fungi, 188, 226.
Hawfinch, 137, 184, 212, 213, 239, 262.
Hawk at Fault, 207.
Hawks, 159.
Hawks and Glass Windows, 238.
Hawthorn in August, 210.
Heartsease, 43, 163, 165, 191.
Hemp Agrimony, 116, 189.
Henbane, 43.
Hen, Recollections of a, 282.
Hermit Crab, the, 64.
Hills and Valleys, 255.
Hippopotamus, a Baby, 88.
Histology, 201.
Hollyberries, Woodcocks and, 69.
Home-grown Currants, 67.
Home of the Swallow-tail, 80.
Honey, Great Take of, 282.
Horned British Caterpillars, 193.
Hornet-sting, 143.
How Fishes breathe, 257.
Human Eye, the, 31.
Hunting for Insects' Eggs, 32.
Hydra, 92.
Hysteriacei, the, 281.

Ice in the Tropics, 28.
Idolocoris elephantis, 131, 185, 211, 234.
Illustrations of Mycology, 159.
In a Tank, 22.
India, British Butterflies in, 209.
Infusoria from Anemones, 115, 142.
Insectariums, Public, 190, 231.
Insect Life, Abundance of, in the Tropics, 66.
Insect Life, Observations on, 23.
Insects and Flowers, 258, 282.
Insects at Bath, 229.
Insects, Catalogues of, 138.
Insects, Defensive Resources of British, 248.
Insects' Eggs, Hunting for, 32, 94.
Insects' Scales, Structure of, 44.
Insects, Shower of, 165.
Insects, Volition in, 22.
Insect Vivariums, 267.
Instinct, Natural, 65.
Introductions, New, 10, 95.
Ireland's Collecting-case, 125.
Ireland, *Trichiurus* in, 113.
Is the Landrail a Bird of Passage? 45, 70, 71, 90, 94.

Jelly-fishes, British, 237.
Jet, 117.
Jet, a Piece of, What it had to say, 73.
Jordan, Fish in the, 166, 189, 213.

Kestrel, my, 62, 88.
Kestrel's Egg, 237, 262.
Kindness to Animals, 136.
Kingfisher, the, 34.

Labels for Mosses, 22.
Laburnum, 46.
Ladybird, Local Name for, 212.
Landrail, the, Is it a Bird of Passage? 45, 70, 71, 90, 94.
Language of Flowers, 91.
Larch Blossoms, 139.
Large Pear, a, 67.
Large Tortoiseshell Butterfly, 234.
Large Wood-ant, 198.
Larks as Song-birds, 105.
Lark, the, 245.
Larvæ of Cockchafer, 184.
Larvæ of Fox-moth, 263, 276, 277, 283.
Lastræa cristata, 279.
Law of Earthquakes, 40.
Lead, Sounding, 117.
Leaves, Monstrous, 279.
Leaves, Skeleton, 252.
Lenses, Correction of, 117.
Lepidoptera, Eggs of, 70, 93, 94.
Leporids, 17.
Life beneath the Waves, 226.
Life, Origin of, 211.
Light of the Glow-worm, 207.
Lignite, the Story of a Piece of, 145.
Lime Deposit in Boilers, 23, 47.
Limnæa glabra, 17.
Limnæa glutinosa, 230.
Liparis dispar, 215.
Loach, Scales of, 280.
Local Floras, 163, 187, 212, 214, 259, 279.
Local Name for Ladybird, 212.
Locomotion of Crass, 65.
Locust Gossip, 79.
Locust Ravages, 47.
Locust-tree, 259.
London Botanical Exchange Club, 96, 114, 117.
London, Field Club for South-west, 92 116.
Longevity of the Goose, 112, 167.
Loose-strife, 19, 47.
Lotus, the, 19, 118, 142, 166.

Love of Natural History, 39.
Luminous Fungi, 69, 91, 118.
Luminous Plants, 121, 191, 243.
Lung of the Frog, 92, 120.
Lythraceæ, 187.

Machine-made Flint Flakes, 190.
Mad Stones, 213.
Man, Ascent of, 166.
Man, Descent of, 112, 143.
Manchester, Sea-birds in, 89.
Manna, Tamarisk, 45, 70.
Manuscript Magazine of Natural History, 283.
Marble, what was said by the Purbeck, 217.
"Marco Polo" Opossum, 148.
Marine Aquaria, 196, 256, 281.
Markings on Podura Scale, 205.
Marygold, the, 19.
Matthews', Dr., Turntable, 68.
May in August, 210.
Melicerta ringens, 164.
Memory in a Wolf, 232.
Men, Rich, 223.
Metropolis, Dragon-flies in the, 17, 46.
Mice, Chanting, 274.
Michaelmas Daisy, 67.
Micrographic Dictionary, 260.
Microscope, New, 44, 68.
Microscopes, Good, 68.
Microscopical Clubs, 92, 115, 141.
Microscopic Fungi, 236.
Microscopic Objects, 64, 140, 164.
Microscopy in New York, 44.
Microscopy, Prize Competition, 274.
Mimicry, Protective, 204, 248.
Mina and the Cholera, 87.
Minnow, Scale of, 44.
Misprints, 21.
Missel-thrush *v.* Squirrel, 131, 189, 214, 237, 238, 256, 257, 278.
Missouri, Big Trees in, 67.
Moeking-birds, English, 153.
Modern Scepticism, 224.
Mole Flea, Parasites in the Interior of a, 88.
Molluscs, Freshwater, 89.
Monkey and Dog, 41.
Monotremata, 224.
Monstrous Leaves, 279.
Monstrous *Ophioglossum vulgatum*, 187.
Monstrous Wallflower, 186.
Monthly Microscopical Journal, 188.
Moss Labels, 22.
Moss, New British, 199.
Moths, Processionary, 106, 185, 209, 239.
Moths wanted, 189.
Moth, the Fox, 263, 276, 277, 283.
Moth, the Goat, 225.
Moth-trap, the American, 216.
Moulting of the Crustacea, 112.
Movable Table, 115.
Musical Cows, 22.
Music of Birds, 233.
Mussel, Movements of the, 89.
Mycological Illustrations, 159.
My Crass, 13.
My Kestrel, 62, 88.
Myrtle, the, 19.

Natural History, Love of, 39.
Natural History, Manuscript Magazine of, 283.
Natural History Specimens, Transmission by Post, 191, 215, 235, 259.
Natural Instinct, 65.
Naturalists' Clubs, 23.
Naturalist's Dredge, 143.
Natural Selection, 42, 70.
Nest of Tomtit, 162.
New Books, 225.
New British Desmids, 44.
New British Moss, 199.
New Dissecting Microscope, 44, 68.
New Forms of Parasites, 131, 185, 211, 234.
New Introductions, 10, 95.
Newts, 111, 143, 166.
New York, Microscopy in, 44.
New Zealand, European Birds in, 209.
New Zealand, Skylarks in, 66.
Nidification, 185.
Night-flies in Brazil, 90.
North London Naturalists' Club, 23, 141.
Nostoc commune, 260.
Notes at Nansladron, 158.
Notes on Rotifers, 110.
Notes on the Fauna of Brittany, 244.

Oak Eggar-moth, 213, 238, 262.
Oak Galls, 240.
Objective for Gas Lantern, 68.
Objects, Covering, 115.
Objects, Microscopic, 64.
Observations on Insect Life, 23.
Œnothera biennis, Fasciation in, 186.
Old Change Microscopical Club, 141.
On Cleaning Diatomaceous Gatherings, 105.
On The Broad, 49, 94.
Oolitic Fossil Plants, 157, 212.
Opercula, 93.
Ophioglossum vulgatum, Monstrous, 187.
Opossum, "Marco Polo," 148.
Orange, a Double, 106.
Orange Peziza, 275.
Orange-tip Butterfly, 161, 208, 238.
Orchid, the Bee, 215, 239, 259, 279.
Origin of Life, 211.
Oriole, the Golden, 158.
Ornithological Queries, 119.
Other Side of the Vivarium, 267.
Otis tarda, 42.
Otter-hunting, 161.
Otters, 17, 89, 161, 189.
Oxlip, Primrose, 115, 133, 163.

Pansy, the, 43, 163, 165, 191.
Papilio Larvæ, the Y-shaped Organ of, 224.
Parasites, New Forms of, 131, 185, 211, 234.
Parasites on *Arge Galathea*, 233, 258, 262.
Parus caudatus, 276.
Paste Eels, 280.
Pear, a Large, 67.
Peculiarity of Hen Canary, 238.
Pedicellariæ of Echinodermata, &c., 42, 119.
Pelopæus, or Sand-wasp, 237.
Perch, Scales of, 260.
Peregrine Falcon, 113.
Periwinkle and its Shell, 90, 118.
Peziza, the Orange, 275.
Phryganea? 283.
Picris Broom Rape, 119.
Pieris daplidice, 263.
Pigeon Posts, 46.
Pigs! bother the, 47.
Pike, Scale of the, 236.
Pineapple, the, 82, 114, 117, 143, 187.
Pistillody, 230.
Pitcher-plants, 235.
Plague of Flies, 238.
Plantain, 210.
Plant Names, 259.
Plants, Fossil Oolitic, 157, 212.
Plants, Luminous, 121, 191, 243.
Plants, Stellate Hairs of, 83.
Plants, to send fresh by post, 259.
Plover and Carrier Pigeon, 229.
Plumed Gnat, the, 18.
Podura Scale, Markings on, 205.
Pollen for the Microscope, 140, 164.
Polymorphic Fungi, 43.
Pomarine Skua, the, 66.
Popular Errors, 70, 92, 93, 117.
Posting Natural History Specimens, 191, 215, 235, 259.
Prawn, the, 65.
Preservation of Specimens, 151.
Preserving Algæ, 20.
Preserving Grasses, &c., 261.
Preserving Pupæ through the Winter, 112.
Primrose, a Triple, 139.
Primrose Oxlip, 115, 133, 163.
Primroses and Cowslips, 133.
Primroses changing Colour, 167.
Prize Competition in Botany, Geology, and Microscopy, 274.
Processionary Moths, 106, 185, 209, 239.
Protective Mimicry, 204, 248.
Protective Resemblance, 237.
Protest, a, 235.
Pterodina patina, 88.
Public Insectariums, 190, 231.
Pupæ, Preservation of, in Winter, 112.
Pupa State, Duration of the, 112.
Purbeck Marble, what it had to say, 217.
Pursuit of Science under Difficulties, 166.
Puttocks, 119, 137.

Quartz, Story of a Piece of, 241.
Quekett Club Soirée, 92.
Quekett Microscopical Club, 115, 141.
Queries, a Budget of, 143, 166, 167.
Queries, Ornithological, 119.
Query, Aquarium, 16, 93.

Ragwort, 215, 238.
Rain, Yellow, 189.
Ramble by the Seashore, 101.
Rare Plants, 259.
Rather alarming! 208.
Rats, 200.
Rat Sagacity, 161.
Rats, Climbing, 47, 66, 161.
Ravages of Locusts, 47.
Recollections of a Hen, 282.
Remarkable Spring, 69.
Remedy wanted, 283.
Retentiveness of Memory in a Wolf, 232.
Retinal variable Sensibility, 243.
Rhagium bifasciatum, 215, 232.
Rich Men, 223.
Ring Ouzel, 257.
Robber Ants, 270.
Robin Redbreast, 76.
Robin, the, 18, 30, 46, 70, 76, 94, 116, 207.
Rock Salt, the Story of, 25.
Rooks, 137, 158, 161.
Rotifers, Notes on, 110.

Saffron, 281.
Sagacity of Rats, 161.
Sand-wasp, 237.
Scales of Fish, 20, 44, 140, 164, 188, 236, 260, 280.
Scales of Podura, Markings on, 205.
Scarcity of the Common Blue Butterfly, 277.
Science, Pursuit of under Difficulties, 166.
Sea and its Wonders, 84.
Sea Birds in Manchester, 89.
Sea Fans, 52.
Seashore, a Ramble by the, 101.
Seaside, a Spring Morning at the, 220.
Sea Urchins, 65, 90.
Sections of Bone and Teeth, 14.
Seeking Protection, 209.
Shamrock, 43.
Shark's Meal, a, 17.
Shells, Cleaning, 118.
Shore, along the, 253.
Shower of Blood, 45.
Shower of Insects, 165.
Shrew, White, 283.
Silver-striped Hawk-moth, 209.
Simethis bicolor, 163.
Singular Freak of Nature, 118.
Sirex juvencus, 166, 214, 215.
Size of Snake, 278.
Skeleton Leaves, 252.
Skeletons, Cleaning, 165, 191, 213, 239, 262.
Skin of Snake, 262.
Skua, the Pomarine, 66.
Skylarks in New Zealand, 66.
Slave Ants, 273.
Sleep, the Cause of, 119.
Slides for Opaque Objects, 236.
Small Eggar, 90, 113, 116, 165, 213, 237, 257, 263.
Snake, Size of, 278.
Snake's Skin, 262.
Snakes, Wild Beasts and, 265.
Snipe, 282.
Snow, Red, 43.
Soil, Depth of, in Cornwall, 70.
Soirée of the Quekett Club, 92.
Soles, Bait for, 237, 261.
Song Larks, 105.
Song of Birds, 92, 150.
Soot, Bees and, 71, 116.
Sounding Apparatus, 117, 137.
South African Diamonds, 11.

South London Microscopical Club, 141.
Sparrows in America, 215.
Specimens, Preservation of, 151.
Speedwell, Buxbaum's, 114, 139.
Spiders, 12, 18, 35, 46, 231.
Spiders, Baby, 18.
Spiders, Darkling, 12, 46, 152, 215.
Spiders, Food of, in Dark Cellars, 215.
Sponge Spicules, 280.
Spring, a Remarkable, 69.
Spring Morning at the Seaside, 220.
Spring Visitors, 138.
Squirrels, 237, 257, 278, 281.
Squirrel, "Ti," the Pet, 103.
Squirrel *v.* Missel-thrush, 131, 189, 214, 237, 238, 256, 257, 278.
Stag Beetle, 283.
Star-fish, 8, 41.
Star-fish, Pedicellariæ of, 42, 119.
Starlings, 258.
Stars, Floral, 210, 239.
Stellate Hairs of Plants, 83.
Sting of Hornet, 143.
Stings, 261, 282.
Stockings, Electric, 45, 69.
Stone, under a, 35.
Story, a likely, 18.
Story of a Boulder, 5, 94.
Story of a Lump of Clay, 125.
Story of a Piece of Lignite, 145.
Story of a Piece of Quartz, 241.
Story of a Piece of Rock Salt, 25.
Story of the "Crags," 271.
Stove for Conservatory, 167.
Street Dog, a, 223.
Strepsodus, Teeth of, 45.
Structure of Insects' Scales, 44.
Subterranean Fish, 112.
Sucker, Cornish, 206.
Summer Migrants, 137.
Sundew, Hairs of, 204.
Sunshine, Bat in, 161, 215.
Swallows, 209.
Swallows building on Cliffs, 233.
Swallow-tail Butterfly, 113.
Swallow-tail, Home of the, 80.
Swordfish, Gill of, 136.

Table, Movable, 115.
Tamarisk Manna, 45, 70.
Tank, in a, 22.
Tea-chests, 142.
Teeth and Bones, Sections of, 14.
Teeth of *Strepsodus*, 45.
Tennyson on Flies, 282.
Theory, the Fungus, 23.
Thuidium decipiens, 199.
"Ti," a Pet Squirrel, 103.
Titmice, 34, 65, 71.
Tit, the Blue, 65.
Tomtit, a Clever, 82.
Tomtit, Nest of, 162.
Tordylium maximum, 163.
Toronto University, 258.
Tortoise Eggs, 208, 263.
Tortoises, British, 263.
Tortoise-shell, Dipterous Larvæ under, 41.
Transformation of a Hairy Caterpillar, 65.
Trawl, the, 169.
Trichiurus lepturus, 17, 88, 113.
Trifolium stellatum, 235.
Trinacria Regina, 115.
Triple Primrose, 139.
Tritons, 142, 166.
Tropical Forest, a, 94.
Tropics, Abundance of Insect Life in the, 66.
Tropics, Ice in the, 28.
Tsetse, the, 66.
Turbid Aquarium, 93.
Turntable, Dr. Matthews', 68.
Twice-told Anecdotes, 192, 212, 237.

Under a Stone, 35.
United States, Forest Fires in, 70.
Uraster rubens, 8, 41.
Urchins, Sea, 65.

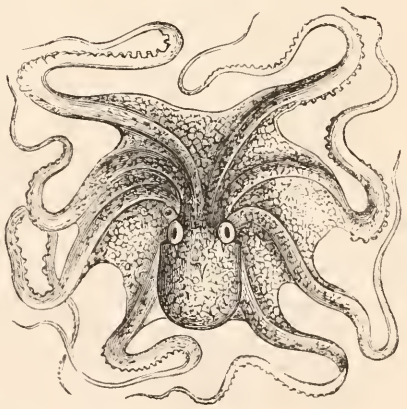
Valleys and Hills, 255.
Vampire Bat, 233, 277.
Vanessa polychloros, 116, 234.
Variations in Colour of Wild Flowers, 270.
Varieties, White, 191, 201, 210, 235, 239, 281.
Veronica Buxbaumii, 91, 139.
Vines at the South, 67.
Violets, 166.
Vivarium, other Side of the, 267.
Volition in Insects, 22.
Vulcanite Cells, 22, 23.

Waxon Bird, 212.
Wallflower, Monstrous, 186.
Wandering Weeds, 67.
Wanted, a Remedy, 283.
Water-snake, 142, 165, 167.
Weasel, Food of the, 42.
Weeds, Wandering, 67.
What the Piece of Jet had to say, 73.
What the Piece of Purbeck Marble had to say, 217.
What to look for, 236.
Wheat Bunt as a Lens, 92.
White Ants, 1, 90.
White Shrew, 283.
White Strawberry, 191.
White Varieties, 191, 201, 210, 235, 239, 281.
Who killed Cock Robin? 18, 46, 70, 94.
Wild Beasts and Snakes, 265.
Wild Flowers, Variation in Colours of, 270.
Willow-leaves for Yeast, 117.
Windhovering, 206.
Winter, Bats out in, 66.
Winter Preservation of Pupæ, 112.
Wolf, Retentive Memory in a, 232.
Wonders, the Sea and its, 84.
Wood, Curious, 23.
Wood-ant, the Large, 198.
Woodcocks and Hollyberries, 69.
Wood, Curious, 23.
Woodlark, 233, 263.
Woodruff, the, 238.
Woolhope Transactions, 226.
Wren, the Fiery-crested, 88.
Wryneck, the, 87.

Xylaria hypoxylon, 77.

Year-Book of Facts, 71.
Yeast, Willow-leaves for, 117.
Yellow Ant, the, 183.
Yellow Rain, 189.
Y-shaped Organ of *Papilio* Larvæ, 224.

Zante Currants in Devon, 114.
Zoophytes, bleaching, 143.



WYMAN AND SONS, PRINTERS, GREAT QUEEN STREET, LONDON, W.C.

WH 1AQH H